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JOURNEYS IN FRENCH INDO-CHINA (TONGKING, ANNAM, COCHIN CHINA, CAMBODIA).

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(*Conclusion.**)

(2) People, Flora and Fauna.

Having now described the main external features of Annamite scenery and life, I pass to the people themselves. The first point to notice is the general uniformity of type throughout the whole Annamite dominions, *i.e.*, in Tongking, Annam Proper, and Cochin China. Writers with a political aim have endeavoured to draw a distinction between these three populations, with the view of suggesting their sub-division into different states. But the difference is no greater than might be expected from the diversity of latitude and climate; and the inhabitants of Hanoi, Hue and Saigon (where not crossed with foreign blood) are essentially the same race, possessing the same ethnological characteristics and the same social organisation. In the north they are better-looking and more robust; the ugliness seems to culminate between Thanh-hoa and Hue; at Saigon the type is more effeminate, the effect of the unbroken heat.

I have seen it stated that the Annamites are the most hideous of the Eastern races. This verdict, which was passed by a gold medallist of this Society, who had never been in Annam, is one with which I entirely disagree. The people are obviously of the Yellow or Chinese stock. The square jaw, sallow skin, prominent cheek bones, thick lips and oblique eyes, testify unmistakably to their origin, and completely discredit the theories, which have found exponents, of Malay or even of Japanese affinity. Compared with the Chinese, Cambodians, and

* The first part of this paper was published in the August number, pp. 97–111. Map, p. 288.

Siamese, who are their next-door neighbours, the Annamites are very short of stature; but they are lithe, well-made, and have small hands and feet. A thin beard and moustache only spring into existence after the age of thirty, and are sedulously cultivated by the elders and Mandarins. There is some difficulty in ascertaining an Annamite's age, because he counts any fraction of a year as a whole year. Thus, a child born on December 31st, 1892, will be two years old by nightfall of January 1st, 1893. In infancy too, no family names are borne. A fancy name is perhaps given in order to forefend the evil spirits by hoodwinking them as to the identity of the infant; or the latter is simply called by his numerical position in the family, as *e.g.*, Père VI., the Annamite priest and Mandarin before mentioned, who was the sixth child of his parents.

Both sexes have very black hair, which after childhood is never cut, but is coiled into a chignon at the back of the head. The bulk of the women whom one sees in travelling through any Oriental country (with the possible exception of Japan) are ugly, some would even say monstrous; nor can I claim an absolute immunity for the average Annamite woman from this melancholy law. Nevertheless, there is a softness and gentleness about her expression that redeems irregularity of feature; whilst a considerable minority of the young girls are positively pretty, and, if containing an admixture of foreign blood, whether Chinese or European, sometimes highly attractive. In travelling I have nowhere encountered a more gentle or amiable race. They have the submissiveness without the nerveless apathy of the Hindu; while they possess industrial aptitudes rendering them diligent workmen, and an artistic ingenuity—I do not say originality—which on the one hand makes them excellent cooks, on the other inspires the various artistic productions, such as inlaid work in mother-of-pearl, embroideries, wood-carving and jewellery, which are still sometimes procurable and are seldom absent from the houses of the wealthy Mandarins. Though not a courageous people in the sense of inviting or voluntarily meeting danger, they are very tenacious in resistance, and make capital soldiers against an Asiatic enemy. They are moreover hospitable, polite, lively, sentimental, and of easy temper. The women present two types, the wife or concubine who is merely the brainless instrument of her master's pleasure, and the active and business-like housewife, who toils hard either in the fields or at the oar, and who in the upper ranks of life frequently takes to business and manages all her husband's affairs. On the other hand, the Annamites have the faults inseparable from an Oriental race that has never been divorced from its own surroundings. They are tricky and deceitful, disposed to thieve when they get the chance, mendacious, and incurable gamblers. They will never lose an opportunity of throwing a die or casting a lot, and the financial embarrassments of the upper class

are responsible for the transfer of so many elegant and antique objects to the cabinets of French collectors.

Polygamy is the custom of the country, there being no limit, beyond expense, to the number either of wives or of concubines that a man may take, although the first wife, not necessarily in chronological order, but in status, holds a position of recognised superiority. In a country where ancestral worship is the pivot of life, the necessity of male offspring is overpowering, and a sterile wife would be the first to suggest and even to furnish a substitute to her husband. Families are very large, the women being of remarkable fertility. Hardly a cottage but contains a swarm of black-eyed, half-naked urchins, a full quiver being a source not of encumbrance but of riches to the happy father, since at a very early age the child can be employed to tend the buffaloes or to pull an oar in the sampan. Though nubile at the age of twelve, the girls are not usually wedded quite so early, and child-marriages like those of India are rare.

In dress there is very little except the hat (which is frequently discarded) to mark the distinction between the two sexes, for both wear the same costume, effectively concealing the lines of the figure. It consists of a long loose tunic (*cai ao*), made of cotton, or in the upper classes, of silk, which comes close up round the throat, is fastened by little brass or amber buttons down the right side, has very narrow sleeves, and falls to the knees or even lower. In Tongking the predominant colour of this tunic among the peasants is chocolate brown, in Annam blue, and in Saigon black. Under this the women wear a chemisette over the bosom, while the rich of both classes wear several light tunics one over the other. Below the tunic the universal garb is a pair of broad flapping cotton drawers (*cai kwan*), white for men, black for women. Both sexes have their legs and feet bare except among the upper classes, who wear socks and Chinese shoes. The far East excels in astonishing hats, and Annam claims its share of the general credit. The commonest male headgear is the turban (*cai khan*) formed of a roll of cotton or *crêpon*, dark green, blue, or brown, which is twisted round the head below the chignon, the ends standing out like horns on either side. But there is also a big conical straw hat for men (varnished over outside and terminating in a metallic cone) which is held on by a string underneath the chin; and at Saigon another variety of coarse fabric with a broader brim, a curving outline, and a lower apex. But the palm for originality (in more senses than one) is carried off by the headpiece of the woman, which is a marvellous circular structure, some 2 to $2\frac{1}{2}$ feet in diameter, made of the leaf of the *cai co*, a plant of the palm tribe, and sometimes most exquisitely fabricated. It has a brim 4 inches deep, which instead of standing up is turned downwards; so that when the whole hat is inverted, it makes a most admirable and artistic tea-tray for a European boudoir. Inside the rim of the hat are fixed one or two

long black silk tassels, which hang down on either side of the wearer's face. With such a headpiece there is small chance of a sunstroke; for the shadow which it throws is more than sufficient to cover the slender periphery of the Annamite woman.

The men smoke minute cigarettes and the waterpipe. But the habitual and universal solace of both sexes is the areca nut and betel (the preparation consists of a piece of areca nut folded in a slice of betel leaf and flavoured with a dash of lime), which is rarely absent from the mouth of man or woman. Its disgusting external effects are well-known, for it blackens and corrodes the teeth, discolours the lips and gums, and fills the mouth with a scarlet saliva that calls for constant ejection. To anticipate or to render more harmonious the effects of this practice, the women invariably lacquer their teeth in advance with a black preparation similar to that which used to be affected by the Japanese, and which makes an open mouth like a yawning sepulchre. Should they scrape off this coating, they lose caste. The men sometimes lacquer their teeth, but are usually satisfied with nature's discolouration. It is to the same practice that I suppose must be attributed the total absence in Annam of that agreeable mark of salutation which has been sanctified by the practice of so many ages, viz., the kiss. Lips so tainted could hardly embrace. Accordingly the only kiss of which the Annamite woman is cognisant is to place her nose against the man's cheek and to rub it gently up and down, with a kind of canine sniff. Both classes have a peculiar gait, with the legs kept rather wide apart and the arms swinging; but it seems to be peculiarly affected by women and Mandarins. Children are carried astride upon the hips of their mothers —an attitude which is apt to produce bandy legs in later life. Burdens are borne at the ends of bamboo poles. When it rains all classes, from the official to the peasant, put on a cloak made of layers of palm-leaves sewn together and absolutely impervious even to a downpour. But they have nothing corresponding to the oiled waterproof paper of Korea, which is uniformly lighter and more serviceable, and can be used as a covering for baggage.

Rice is the staple food of the peasantry, being pounded by the women in mortars of stone or wood. The Annamites dispense with chopsticks and eat with their fingers; an immense amount of fish is also consumed, and its capture is the second great national industry. In many of the rivers, and also on the coast, traps are set by an intricate arrangement of light bamboo stakes and palisades. In Cochin China huge circular nets are let down from a projecting hole at the end of the sampan, and are seldom pulled up without some spoil. In the *bacs* of Annam I saw men prodding the bottom for shell-fish; in the Siem Reap River in Cambodia they were thrusting with spears under the trees. The Talé Sap or Great Lake and the Lower Mekong swarm with every variety of fish. At points along the Annamite coast oysters and lobsters are found;

prawns are universal, and at a fishing-village named Balong, near Thanh-hoa, it was said that regularly every year a shoal of whales is expected in the month of March. The popular drink is weak tea, while the only intoxicant consumed on at all a large scale is arrack or brandy distilled from rice.

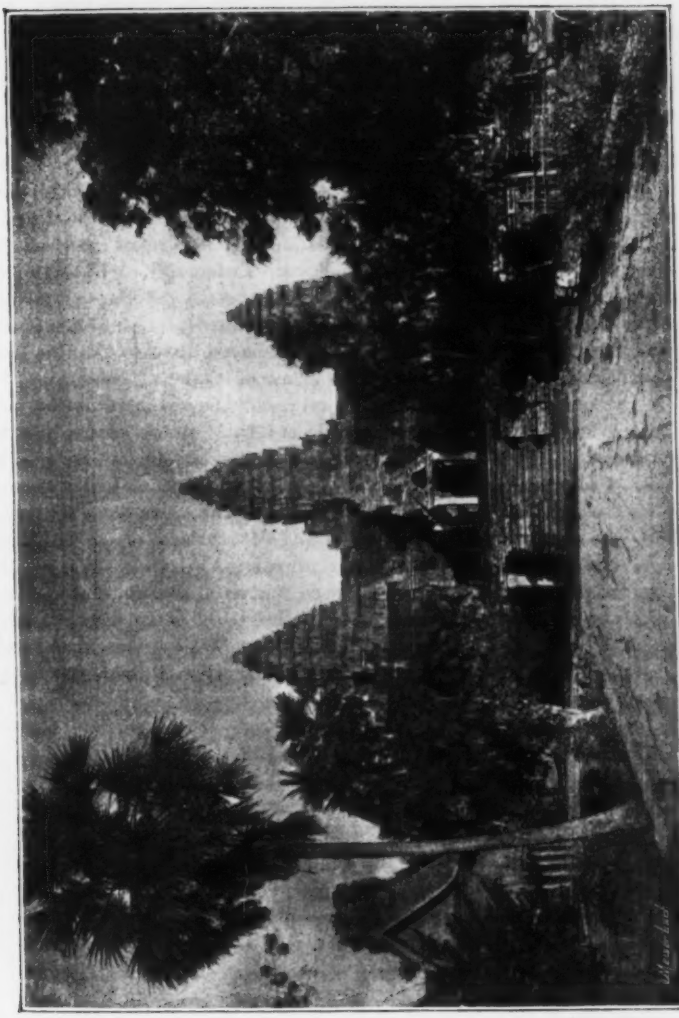
The vegetation of Indo-China is almost uniform from China to Siam. In the deltas and along the rivers there is a luxuriant growth of bamboos, bananas, and palm trees, chiefly the areca and coco-nut, but also lower and more stunted types. Among other fruit-trees are the jack fruit, mango, mulberry, tamarind, letchi, orange, lemon, pine-apple and bread fruit. Vegetables are represented chiefly by beans, onions, radishes, and sweet potatoes. Tobacco is grown for local consumption; cunao and indigo yield their respective dyes; cinnamon is exported in great quantity by the Chinese from Annam, Faifu, south of Turan, being the principal mart for this valuable product. A vegetable oil is extracted from several trees.

Game is abundant in Annam, and embraces many varieties from the most important large game, such as elephants and tigers, to the smallest water-fowl, such as snipe. The elephant is found in the provinces south of Hue. All those captured or killed by the natives belong of right to the Emperor, and a corps of royal hunters is maintained as in Korea, who pursue their illustrious quarry with huge matchlocks, and a bullet not much smaller than an orange. It may be judged that their annual bag is not very large. The tiger is exceedingly common in the mountains of Annam, and is regarded by the natives with so wholesome an awe that he is frequently worshipped as a god. Driven down to the plains in search of food, he sometimes attacks the *tram*-coolies and postal couriers when discharging their errands, and they have a particular and excusable aversion to going alone at night. The extermination of the beast is encouraged by a reward of 20 dollars, which is paid upon production of the pads, skin, and tail. It is a curious fact that the same spots are commonly frequented by the tiger and the wild peacock. Whether they have a similar eye for the beauties of nature, or whether the tiger enjoys lying down outside the peacock, I do not profess to determine. In the mountains may also be encountered wild oxen, wild buffalo, moufflon, and three varieties of deer, of which two resemble our red and fallow. Monkeys abound in parts, and on the peninsula of Tiencha, off Turan, there is a peculiar variety with grey skin, white face, legs and tail, a red beard and black paws. They are difficult to capture living, and not easy to bag dead, for as soon as one has been wounded or shot its comrades will pick up its body and carry it off. In the jungles the wild cock (the ancestor of the farmyard chanticleer) is found, also several species of pheasant, including a species of argus, and the English hare. Wild ducks and snipe abound, also herons and egrets, whose white plumes are exported to gratify the humour of ladies and the vanity of

colonels. From some islands off the coast near Turan also comes the peculiar delicacy so much appreciated by the Chinese palate of swallows' nests. The article consumed in the form of soup is a gelatinous secretion deposited by the saliva of the bird on the interior of the nest, and when properly flavoured is far from disagreeable to the taste. The commonest domestic animals are buffaloes, which are used everywhere for ploughing the rice-fields, and of which there are said to be over one million in Indo-China, and a species of pretty, meek-eyed, brown-skinned oxen; pigs and fowls are universal.

The French anticipate a great future for the coal-fields of Annam, though their roseate expectations fall unexpectedly short of the point of providing the capital requisite to work them. This accordingly is supplied by Hongkong financiers; and if ever it arises that Cardiff and Nagasaki are ousted from their command of the China Seas by Tongking and Annam, and that French men-of-war coal in French Asiatic harbours to molest British commerce, it will be to British investment that the result will be due. I visited myself the coal-mines of Hatu, near Hongai, on the Bay of Along, which have so far produced the best results; as also the more recently opened galleries of the mines of Nongson in the mountains, at a day's journey by river south-west of Turan. Opinions have hitherto differed somewhat as to the value of this coal as fuel for steamers, some ships' captains having reported most favourably, while others have rejected it after trial. It would appear that the best quality burns well, being a fine bituminous coal; but that the coarser samples require a greater draught than most grates admit of, and also crumble easily to coal-dust. To utilise this residuum a briquette factory is about to be established at Hongai. One phenomenon these mines present, which I imagine must be unique in the world. At Hatu I saw a solid seam of black coal 180 feet in depth, exposed down the entire front of a hill; nor had the bottom of the seam yet been ascertained. Coal also exists, and is worked, at Nagotna, near Hongai, at Kamfa and Kebao on the same south littoral of Tongking, and has been discovered in large quantities in the interior at Yenbai, Laokai, and Kwangyen.

As regards the best season for travelling in Indo-China, the geographical conditions of the three territories result in very marked differences of climate; for whereas in the two deltas of the Red River and Mekong, the seasons, regulated by the north-east and the south-west monsoon, are rainy from the month of May to August, and intolerable because of the intense heat, while the months from October to April contain the more agreeable weather—in Annam, where the Annamite Apennines, running parallel with the coast along its entire length, arrest the winds and condense the vapours raised by evaporation from the sea, the dry season is between January and September, and the wet season from September to December. The best season for visiting



MAIN APPROACH TO ANGKOR WAT.

Tongking and Cochin China is therefore between the months of November and January. Annam, on the other hand, is best in March. Europeans find life very hard in each of these territories in the hot season; and dysentery and fever are with difficulty avoided.

(3) Turan to Hue.

Before leaving the subject of Annam, I propose also to describe the route from Turan on the sea coast to Hue, since it is the road that nineteen persons out of twenty, bent on visiting the capital, will follow, and since no itinerary of it, so far as I know, exists in the English language. Steamers of the subsidised Messageries Maritimes Company touch fortnightly at the ports of Turan, Kwinhon, and Nia-trang, on their way from Haifong to Saigon, and *vice-versâ*. A line of German merchant steamers also runs at irregular intervals from Hongkong direct to Turan. Access to Hue is more directly gained from Thuanan, a small French post at the mouth of the Hue River, distant by water about 9 miles from the capital; but the steamers do not stop there—very wisely, since, during at least a third of the year, while the north-east monsoon is blowing, the bar is impracticable for any kind of boat. Whilst I was in the neighbourhood not a single craft had crossed it for five or six weeks; and the breakers were a gruesome spectacle. The distance between Turan and Hue is 100 kilometres, or 63 miles, and it is usually accomplished, in a chair carried by coolies, in two short days. I made the journey twice, once in each direction; but the conditions on one occasion were so unfavourable, the entire country being inundated, and every species of misadventure befalling me, that I took a much longer time. The intervening stages and distances are as follows:—

	Kilometres.
Turan*	
Namo*	13
Lien Kiu	6
Col des Nuages*	9
Leng-ko*	7
Pass of Fu Gia	7
Nuok Ngok* (*tram*-Thua-lien)	4
Pass of Cholmai (Thua-mai)	9
Cohai* (Thua-hoa)	5
Thuanong*	20
Hue*	20
Total	100

From the little settlement of Turan, lying at the south side of the bay of the same name, the imposing mass of a transverse ridge, projecting from the main inland range, can be seen dominating the bay on its

* *Tram.*

northern side and terminating in a wooded cape in the sea. This range, which separates the provinces of Kwang Nam and Kwang Duk, has been the immemorial defence of the capital; since it requires to be crossed by any enemy advancing from the south. Its highest peaks are between 2000 and 3000 feet above the sea; but the saddle by which it is crossed, and which the French call the Col des Nuages, is 1550 feet in elevation.

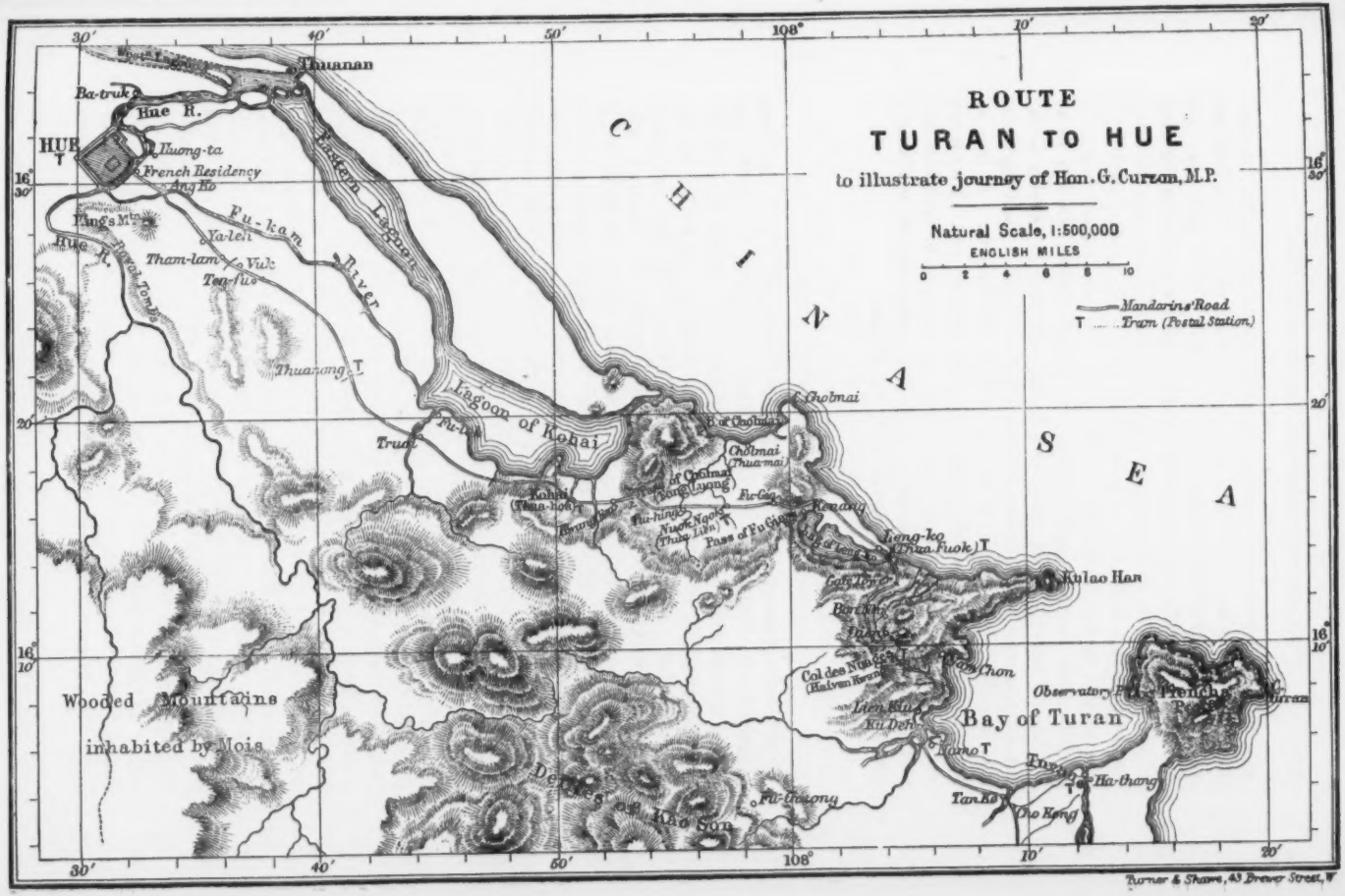
Leaving Turan, the route for some time skirts the sea-shore, then crosses a *bac*, spreading out into a river, up which fishing-boats sail across a bar from the sea, and arrives (two and three quarter hours) at the first *tram* of Namo, where coolies are changed. This is a pretty little village, with a single street, situated near a wooded knoll on the banks of a river whose waters spread themselves out into one of those lagoons which I have described in the opening section of this paper, one of its two marine outlets beings already choked. Two branches of this river require to be crossed in ferry-boats, and we then arrive at Lien Kiu (one hour). Shortly after commences the ascent of the main ridge by the new road, which has been constructed by the French since their occupation of the capital. Passing the hamlet of Nam Chon, where Captain Besson and six men were murdered by Annamite coolies while building the road as lately as 1888, we mount by easy gradients, till after climbing a final steep slope, we arrive at the Col des Nuages (two hours). Here is a *tram* and the second change of coolies. The saddle between the two peaks was formerly entirely built across, and occupied by a walled enclosure with two gates, one of entrance, the other of exit. This was defended by cannon and by a garrison of fifty soldiers, and effectually commanded the pass. Now the wall is broken down, and the road skirts the fort without entering it. In the interior I found a number of rusty iron carronades under a shed, and a fine bronze cannon, with an inscription showing that it was presented by Spain to the King of Cochin China in 1689. On a clear day the two-fold view from the Col des Nuages (sometimes also called the Iron Gates, and by the Annamites Haiven Kwang) is one of the most beautiful in the far East. The retrospect to Turan embraces the curving outline of the bay far below, the wooded peninsula of Tiencha by which it is closed on the south, the white line of Turan, the Marble Mountains protruding their contorted heads from the sand dunes beyond, and inland a panorama of mountains enclosing the plain. On the north side the eye wanders over the superbly wooded slopes of the ridge, where mountain streams are heard rushing through the foliage, and waterfalls throw a fleecy scarf against the sombre background, and rests upon the glassy surface of a distant lagoon, separated from the sea by a glitt ing sandspit, upon which the breakers are plunging in yellow foam.

Descending we pass in a few minutes the little hamlet of Dien, then

(fifty minutes) the hamlet of Bon Nhi on the banks of a stream; later (forty minutes) a gate-tower with an inscription in three tablets, formerly occupied by a road-guard to command the approach to the main pass. We are now on the lower slopes of the ridge, from which we presently descend by a very steep declivity to the maritime exit of the big lagoon (two and a half hours after leaving the *col*). Here we have to cross the channel by a ferry, and may once again observe the phenomenon of a lagoon whose sea-mouth is in rapid process of being silted up by the action of the winds and tides.

Upon the far side of the *bac* is situated the picturesque village of Leng-ko, with a cluster of coco-nut palms, an avenue of oil trees, numerous pigs, and a population that subsists upon fishing. At the *tram* here called Thua Fuok, we take on the third relay. Thence the road continues along the narrow sandspit that separates the still waters of the lagoon from the booming sea. There is a smell of rotting vegetation in the air, and the physical features—the lagoon, the sandspit, and the breakers—suggest an irresistible reminder of the *murdabs* or "dead waters" in the Persian provinces on the south shore of the Caspian Sea. In summer the sand is sometimes so hot that the coolies cannot tread upon it with bare feet. In the low scrub, with which it is overgrown, may be seen circular mounds of glittering white sand, the last resting-places of former inhabitants of Leng-ko. A march of one hour and a half brings us to the extremity of the lagoon, where is the tiny village of Kenang. Climbing a steep saddle by steps partly fashioned, partly hewn in the natural rock, from the top we discover a new outlook over a plain, across which the track is seen running to the base of a single wooded hill. In an hour we reach the village of Nuok Ngok, lying in the middle of a soaking plain, where brown buffaloes are wallowing in the marshes, green turtle-doves flit from tree to tree, and white egrets fish lazily in the swamps. Continuing we arrive (one hour forty minutes) at the base of a third pass or col known as Fong Luong or Cholmai (lit. Thua-mai), climbing and descending which we pass (fifteen minutes) the village of Kwang Rap, and (thirty minutes) reach the larger village of Kohai (lit. Thua-hoa), where also is a *tram*.

From this spot there are three ways of proceeding to Hue, or *vice versâ*. (1) Continuing by land along the Mandarins' Road, a distance of 25 miles, which is bisected by the *tram* of Thua-nong; (2) by a steam launch up the lagoon of Kohai to Thuanan, and thence to the capital; and (3) a route sometimes adopted on the return journey from Hue, whence a *sampan* can be taken at nightfall by the traveller, who sleeps while the boat is propelled along a canal leading into the Fu-kam River, which debouches into the lagoon of Kohai, where he arrives in the early morning. I unfortunately adopted the second of these routes on the upward journey, with disastrous results. The whole country was under water owing to torrential and incessant rains, and there were no


ROUTE
TURAN TO HUE
to illustrate journey of Hon. G. Curzon, M.P.
Natural Scale, 1:500,000
ENGLISH MILES
0 2 4 6 8 10
Mandarin's Road
T ..... Tram (Postal Station)
Thuanan
Ba-truk
Hue R.
HUE
Huong-ta
French Residency
Ang Ho
Tangs Mts
Hue R.
Ya-leh
Tham-lam
Vuk
Ten-fus
Thuanong T
Tombs
Pu-kam
Eastern Lagoon
River
Lagoon of Kohai
Pu-Deh
Truck
Kohai (Thua-hoi) T
Pu-hinyo
Nuock Nack (Thuke Lito) T
Pass of Fu Ghoi
Chôlmai
Thua-mai
Fir-Cap
Kemarah
Hang-ko (Thua Huok) T
Kulao Han
Bay of Turan
Wooded Mountains
inhabited by Mois
Deltas of Vao Son
Fu-Quong
Tamo T
Tan-Ko
Tho Hong
Ha-thang
Observatory
French Residency
Turan
CHINA SEA
Turner & Shaw, 43 Brewer Street, W

means of distinguishing the lagoon from inundated rice-fields. Accordingly the steam launch ran aground, lost its way, ran short of fuel, and committed every possible transgression, compelling me to pass one night in a miserable fishing-boat, and the next in a native hamlet on the shore of the lagoon. The latter runs northwards, parallel with the sea coast, from which it is separated only by a line of sand dunes, and leads into the mouth of the Hue River at Thuanan. At the latter place are a small French garrison, signal-station, and custom house. On the broad surface of the combined river and lagoon are dotted several islets, formerly occupied by Annamite forts, which little more than ten years ago disputed the passage of the river with the French. A line of sunken junks also blocked and still obstruct the channel. Two hours steaming up the Hue River, whose banks are adorned by delicious and smiling verdure, at last deposits us, after a journey, however *accidenté*, of surpassing natural beauty, at the capital of Annam.

(4). Hue.

Originally chosen as a Royal residence in the middle of the 16th century by one of the Nguyen family, who established a sort of Shogunate in the southern part of the dominions of a *fainéant* Emperor of Annam, Hue only received its present form at the beginning of the present century, when, after a period of rebellion, it fell into the hands of the last surviving descendant of that dynasty, the monarch who assumed the ruling title of Gia Long, and was the Louis XIV. of his country's fortunes. He built the Citadel, an immense enceinte on the Vauban plan, with the aid of the French officers who had entered his service and had assisted to place him upon the throne. He laid out and adorned the Palace; and any work of distinction in the capital or neighbourhood is attributed to him with as unfailing regularity as to Shah Abbas in the kingdom of Iran. The Hue River, flowing down from picturesque mountains that raise their wooded cones at a distance of only a few miles from the walls, leaves the city and citadel (which is further surrounded by a broad moat) on the south side, and separates by over ¼ mile of water the native quarter from the French Residency. The town itself consists, as I have said of all Annamite cities, of two parts; the Citadel, which is the seat of government, royal or provincial, and a cluster of native villages assembled within its shade. Before Hue was known the fancy of writers raised the numbers of this aggregation to a total of 150,000 inhabitants. Even now French books record 50,000, but I should be disposed to place 12 to 15,000 as an outside limit, although the extraordinary size of Annamite families may perhaps justify a higher estimate. The citadel consists of a bastioned quadrilateral 2000 yards in length on each face, entered by ten gates with lofty, two-storeyed towers, over stone bridges across a moat 40 yards

wide. Four hundred guns originally defended the embrasures, but are now for the most part consigned to a prudent seclusion. In the heart of this great and utterly indefensible enclosure, over which houses are scattered at irregular intervals, and much of which consists of unoccupied gardens or grounds, is a second walled enceinte, 800 yards square, containing the Royal Palace. This is exclusively peopled by women and eunuchs, with the exception of the sovereign; the royal guards, ministers, and Mandarins, having their residences outside. A fortified redoubt called the Mong-Ka on the eastern face of the citadel was ceded to the French in absolute possession in 1884, and contains the French garrison composed of the Marine Infantry, only 200 strong. A canal, the Dong-ba, crossed by two wooden bridges, separates these official and military quarters from the native town. Occupying a flat position the city presents no salient features upon approach, little being visible beyond the walls of the Citadel, and a pentagonal structure or tower inside it, which supports the Royal standard.

Nothing more pretty than the environs of Hue can well be conceived. On the banks of the river elegant and fanciful pagodas peep from behind a screen of palms and bamboos. Native villages are buried in depths of waving green. The lowlands, where not partitioned in rice-plots, are overgrown by a wealth of flowering and prickly plants. The mountains are wooded to their summits with pines and banians—a junction of Scotland and the Tropics. At a little distance up the river is an arena, or circular structure—now disused—where combats of wild animals were held as late as the days of Tu Duk. But the most remarkable of the environs of Hue are unquestionably the Tombs of the sovereigns of the reigning dynasty, from Gia Long to the last Emperor Dong Khanh, which are situated at a distance of some miles from the capital in wooded valleys on either bank of the river. The scheme of the finest of these structures, upon which tens of thousands of labourers were employed for years, consists of gardens, lakes, and summer-houses, whither the Emperor could retire for recreation in the summer, and where a memorial hall or sanctuary received the furniture of his apartments, the altar containing his tablet, and his principal surviving wives, after his death; and of a vast enclosure, usually elevated upon successive terraces, rising from the banks of serpentine ponds, and culminating either in a timbered mound or in a walled enclosure, wherein some hidden nook, disclosed to none but a select few, conceals the royal corpse. Every year the reigning monarch must visit each of these tombs, offer sacrifice, and perform his *lais*, or obeisance, before the spirits of his ancestors. It would appear from the character of the landscape-gardening, with which these tombs have been adorned, so un-Oriental in type, that the earlier sovereigns of the dynasty must have received from the French officers in their employ the plans of French gardens of the seventeenth and eighteenth centuries —of Fontainebleau and Versailles. With the accession of Tu Duk a

more strictly native style was pursued; and the tombs of that monarch and Dong Khanh have in them nothing of the French. Amid these gracious and ornamental surroundings of pinewood and winding lake, the sepulchres of Annamite sovereignty are worthy of comparison with any royal tombs in the world.

Of the native government in Annam this is not the place to speak; but I may say that it possesses five main characteristics: (1) The throne is invested with a sanctity peculiar to China and its once dependent states, whose sovereigns are one and all regarded as the sons of Heaven; (2) it has won and retains this prestige independently of the ordinary supports to a powerful throne—viz., a hereditary aristocracy and a priesthood, neither of which exists in Annam; (3) the official ranks are recruited by an educational test which is genuine, though straitened, and is therefore democratic in its operation; (4) Annam exhibits the spectacle, unique in the East, of a complete decentralisation of administrative and executive authority, due to the institution of a communal system, which is enshrined in the customs of the people, and has long familiarised them with the liberties of self-government to which Europe is now returning; (5) the durability of the native *régime*, which is unsustained by military force, and incapable of withstanding a serious attack from without, will depend less upon the Annamite Court than upon the humour of the French, who are now tardily, but wisely, adopting the policy of ruling through the natives, and who, if well-advised, will endeavour to convert Annam into a sort of Indian feudatory state.

IV.—Travel in Cambodia.

(1) Saigon to Pnompenh and Angkor Wat.

Travel in Cambodia will, in the case of most voyagers, take the form of a visit to the capital Pnompenh, and to the famous Khmer ruins of Angkor. Since the latter are deserving of a far more widespread attention than they have yet received at English hands, and since they are likely to be increasingly visited by Englishmen in the future, it may be useful to append some reliable information as to the means of reaching Angkor. Geographically these are two. The ruins are situated at a distance of about 12 miles inland from the north-west extremity of the Talé Sap or Inland Sea, whose waters and coasts are divided between Cambodia and Siam. The entire lake, which is a comparatively late creation, synchronous with the formation of the present Mekong delta, and fills the site once occupied by the sea-margin, appertained to Cambodia, until the wars at the end of the last century transferred the provinces of Angkor, or Siem Reap, and of Battambang on its north and south shores to Siam. The latter has remained in possession of them ever since, and has been confirmed in her ownership

by a treaty concluded in 1867 with the French, after the latter had assumed the protectorate of Cambodia. Though Cambodian in historic association and surroundings, the ruins of Angkor are therefore now in Siamese territory—a source of great annoyance to the French, and of some mortification to the Cambodians. It will be accordingly either from French or from Siamese territory, *i.e.*, from Saigon, or from Bangkok, that the traveller will start as a base, making the journey in the one case, with considerable ease, at certain periods of the year, by water; in the other case, with greater difficulty, but at nearly any season of the year, by land. I will briefly indicate both routes.

Excellent river steamers connect Saigon with Pnompenh, the modern capital of Cambodia, and the residence both of the King, and of the French Resident Superior—performing the ascent in two nights and one day, and the descent in a less time. The city is situated at a point on the Mekong, called by the French Quatre Bras, because the river is there divided in the form of a X, two streams which flow from the north-east and to the north-west respectively, uniting opposite the town and being again split up into two channels, flowing south-west and south-east. From Pnompenh, in the months from August to the middle of January, a subsidiary service runs once a week to the Talé Sap, touching on the following day at the mouth of the Siem Reap River on the north shore of the lake for Siem Reap and Angkor, and at a similar spot for Battambang on the south shore. After the middle of January the waters of the Mekong, and the lake which it feeds, sink too low to admit of steam navigation, and a traveller making the ascent from Cochin China would then have a long and tedious ascent of the river and lake in a native sampan. The French company (Compagnie des Messageries Fluviales) advertise an arrangement by which they undertake with their steamers to convey the traveller to the mouth of the Siem Reap River, conduct him thence to Angkor, show him the ruins, arrange for his accommodation and subsistence while there for a period of three days, and bring him back to Saigon twelve days after his original departure—all this for 50 dollars a head. I do not advise anyone to take advantage of this scheme, because instead of three days at Angkor he will find that he has less than one—and a man might as well try to see the ruins in one day as to see London in an hour—whilst he will spend two days of his twelve in waiting for a connection at Pnompenh. Let the stranger profit by the steamers for ascent and descent; but let him make independent arrangements for as long a stay at the ruins as he can devote thereto, and on no account endeavour to "rush" the expedition.

The north shore of the great lake of Talé Sap (called by the French, for what reason I do not know, Tonlé Sap), is one of the most peculiar in the world. Its only coast-line is the stems of trees, the greater part of whose height is immersed below the surface of the water, and is only entirely laid bare during the dry season. Through the upper branches

because it's correct,
that's why.

of these the river of Siem Reap lazily struggles to the lake. Embarking in a native sampan, the traveller proceeds for two hours and a quarter up the river, being alternately poled, pulled, or dragged through the shallow channel. It was the beginning of January when I made the ascent, and the water was already sinking rapidly. At a point whence it was impossible to continue further by the river, horses and oxen had been sent to meet me by the Siamese Governor of Siem Reap, who had been apprised of my arrival from Bangkok. A ride of one hour and a half, first through a jungly swamp and subsequently amid delicious scenery along the right bank of the Siem Reap River, which is here of larger dimensions, brought me to the town of that name, and capital of the province, administered by a governor subordinate to the Royal Commissioner at Battambang. The town consists of a few thousand people, and is a picturesque collection of successive hamlets of palm-leaf cottages built upon lofty piles in a shady grove, straggling for some miles along either bank of the river. There is an old-fashioned citadel with battlemented walls, bastions, and gate-towers, which contains the official buildings; but the governor prefers to reside in a private residence on the opposite bank. A *sala*, the Siamese expression for a rest-house, and substitute for the Annamite *tram*, is here placed at the disposal of strangers, but will not as a rule be occupied by anyone anxious to push on to Angkor. A further ride of about 3½ miles along an excellent path through beautiful jungle scenery, will bring him to the outer terrace of the great temple of Angkor Wat. I should add that all the ponies here seem to be the property of the Governor, and can only with difficulty be procured by strangers, who must ordinarily put up with rude springless carts drawn by oxen.

I can here embark upon no general description of the ruins of Angkor, a study which would befit an archæological better than a geographical society. I will content myself with remarking, after a very careful study of all the remains, which cover an area of some 20 miles square; (1) as regards their purpose, that they were neither dedicated to snake worship, as imagined by Fergusson in his 'History of Architecture;' nor to Buddhism as supposed by Garnier, de Lagrée, and Mouhot; nor to a mixture of the two, as inferred by Vivien St. Martin; but to Brahmanism, pure and simple, upon which, at a later date, were grafted Buddhistic additions, the statues of Buddha in many cases, after the introduction and triumph of that faith, replacing the images of the Hindu deities in the niches and shrines; (2) as regards their origin, that they were constructed by a race, known as the Khmers, who came, in all probability overland, from India, conquered the country, and acquired its throne, but whose traces, except in so far as they are merged in the modern Cambodians, have entirely disappeared; (3) as regards their date—a matter in which we have received invaluable assistance from the inscriptions that have been deciphered by French scholars—that they

were erected at different periods between 700 and 1100 A.D.; (4) as regards their material, that all the older buildings are constructed of two varieties of stone—a hard, fine-grained sandstone, invariably employed for the sculptures, and a coarse porous red stone for the substructures; but that the later buildings are made of well-burned and durable bricks; (5) as regards their architectural features, merits, and style, that they constitute on the whole the most remarkable body of ruins in the world, whether we regard the prodigious magnitude of the ground plan, the grandiose dimensions of the principal palaces and temples, or the artistic beauty and delicacy of the bas-reliefs and sculptures; (6) as regards their present condition, that, with the exception of the great temple of Angkor Wat, which is in its essential features comparatively well preserved, the buildings are fast tumbling to pieces, being buried in a deep jungle through which a path has often to be cut with a bill-hook in order to reach them, and whose trees and creepers, insinuating themselves between the stones, are rapidly causing them to fall into irretrievable ruin.

I may, however, opportunely add a word upon their geographical distribution. The remains practically consist of seven main groups, situated at wide distances apart and separated by obscure jungle paths. They are (1) the ruins of the hill of Pnom Krom and at Athvea, on the right bank of the Siem Reap River, near the lake. (2) The great temple of Angkor Wat, 3½ miles north-west of Siem Reap. (3) The hill of Bakheng, ½ mile north-west of Angkor Wat, and the multitudinous ruins contained either inside or immediately outside the vast enclosure of Angkor Tom, the royal city, situated a little further in the same direction. (4) The great lake and summer palace of Barai Mebom, about 5 miles to the west. All these are on the right, or west bank of the river. Then on the other or east bank are (5) the group containing the ruins of Prasat Kao, Taprom, Kedei, and the artificial lake of Sra Sang; (6) to the south of these, the brick group of Bachum, Mabon, and Prea-rup and; (7) considerably to the south of these, and about 8 miles almost due east of Siem Reap, the brick group of Lolei, Pra-ko, and Bakong. It is only by visiting all of these remains that the visitor can form a fair idea, not merely of the scope and range of the Khmer architecture, but of the different features that marked its rise, culmination, and decline.

(2) Siem Reap to Bangkok.

The overland journey from Bangkok may be made by a traveller starting from that base for Cambodia, but will hardly repay any one who has already visited the ruins from Saigon. Nevertheless I append the stations and distances for the help of such as care to make the journey. It should be premised that careful preparations must be

made in advance, and every article of food, drink, and bedding procured beforehand.

The parts of Siam traversed are very sparsely inhabited, and the people in the villages are terribly poor; consequently nothing can be bought but an occasional fowl and a few eggs. The water is unreliable, and a filter is a *sine qua non*. The means of locomotion are ramshackle wooden carts or wagons drawn by oxen, which only make about 2 to 2½ miles in the hour, and rarely more than a stage of 16 miles in the day. If fortunate, the traveller will procure ponies for himself and servant; but these are not invariably forthcoming, and even if they are, little beyond comfort is gained by their superior pace, since a halt has to be made to enable the baggage to come up every night. Some persons purchase their own oxen and ponies, take them right through, and sell them at the end; but it is preferable to travel, if possible, with the assistance of the local governors (set in motion by the kindly offices of the Siamese Government), who have it in their power to provide carts, oxen, and ponies at each stage, or sometimes elephants. The latter, however, furnish a slow and tedious instrument of advance; nor is the seat on a Siamese howdah particularly comfortable. At night the resting-place is a *sala* or open rest-house. Some of these are in a state of utter decay, and the traveller may require or prefer to sleep in the open air. The journey is an uninteresting one, inasmuch as three days are spent inside the forest, where nothing at all can be seen, and four days in traversing an open plain covered with grass, which grows higher than the head, and equally obscures the view. After twelve or thirteen days, the duration being dependent on the season of the year and the state of the tracks, a point is reached, either, if there is sufficient water, at Paknam Kabin, or if not, then further on at Pachim, where a native boat can be taken, and the descent made by river to Bangkok, a distance from Pachim of 70 miles. The duration of the entire journey from Siem Reap will probably be about fifteen days, and for its successful prosecution are required a guide, who knows the route, and can speak Siamese, a decent cook, and considerable patience. These desiderata not being always forthcoming, the traveller who is without any two of them had better leave Angkor as he approached it, viz., by water through Cochin China.

Route from Siem Reap to Bangkok.

Siem Reap to Banpuok, 13 miles; Pumentik, 14; Tuk-cho, 13; Fra Neat Fra, 15; Sesupon, 14; Arranh Kao, 18; Arranh, 17; Wattana, 14; Ansinla, 14 (or Srakao, 20); Dong Khanh, 16 (or Patrang, 15); Kabin, 16 (or Kabin, 12); Paknam Kabin, 6; and thence by boat to Bangkok—or Chantakam, 20; Pachim, 12—total, 196 miles; and thence by river to Bangkok, 70 miles.

After the reading of the paper the following discussion ensued :—

Mr. JOHN THOMSON : My exploration of Cambodia in 1866 is now rather ancient history, and my knowledge of this section of Eastern Asia is mainly confined to Siam, Cambodia, and Lower Cochin China. At that time I examined the principal antiquities, and made a detailed survey of Angkor Wat (properly Nakhon Wat), which enabled me to produce a ground plan of the entire building.* I took a large number of photographs both at Angkor Wat and Angkor Thom or "Inthapatapuri," the capital of ancient Cambodia. In this city distinct evidence is found of different periods in building, sculpture, and inscriptions, some of which had been partly translated at the time, denoting a higher antiquity than that assigned to them by Mr. Curzon. This view appears to be borne out by the Chinese annals. In the "Teen-hia-kwo-le-ping-swo," there is a note (date about 140 B.C.) on Cambodia under the name Chinla, a name by which the country is identified, and may be traced in subsequent Chinese writings, where it is also noticed under the names Funan and Kanpoji. The ruins are found as far north as Korat in Siam, further south than Angkor Wat, and extending over a wide area east and west. Many of the ruins are important, and are linked together by stone causeways raised well above the autumn flood levels, and were evidently intended and used by the ancients for extensive traffic from city to city. Adjoining the causeways one finds great stone reservoirs which must have been designed for use during the dry season, when water is scarce. Some of these reservoirs have the same characteristics in the mode of building as Angkor Wat. The quarries from which the stone was obtained are 30 miles distant from Angkor Wat, and one can hardly conceive of any means by which they could have drawn the huge blocks over hilly ground to the capital. The blocks used in building Angkor Wat are so closely fitted without cement that they must have been ground together, as the line of union is hardly to be seen. The stones in all cases were first fitted together and afterwards sculptured in a most elaborate and artistic manner. One sees in Angkor Wat evidence proving how closely it was allied to the Brahmanical cult, evidence which I published at the time. For example, a vast area of the walls of the temple behind its screens of pillars, is devoted to sculptured illustrations of the incidents in the poems, the "Ramayana" and the "Mahabharata," well-known to Oriental scholars. When in Cambodia, the King of Siam sent a special envoy to request me to photograph the entire series, a request with which I was unable to comply. At that time the kodak was unknown, and one had to depend on the collodion wet process of photography. This entailed the constant presence of eight or ten porters to transport the necessary apparatus. But the process had this advantage; as each plate was taken it was at once developed, so that one could see and judge of its value. I would have shown you a series of my photographs taken in 1866, but it is now too late to detain you. My original ground-plan of Angkor Wat may be seen in the adjoining room.

Mr. ANNAN BRYCE: It has struck me, and I don't think this has hitherto been noticed by any one, that there are several points of resemblance between the ruins at Angkor and those at Pagan in Upper Burma. Pagan was for some centuries the capital of Burma, and was destroyed in 1284 by an army of Kublai Khan. There are resemblances not only in certain features of design, form, and decoration, but in the fineness of the work. It is difficult to insert a knife in the joints of some of the brickwork at Pagan, just as it appears from Mr. Thomson's account to be difficult to do so in the case of some of the stone-work at Angkor, and it is noteworthy that

* See Thomson's 'Straits of Malacca, Indo-China, and China.'

many of the buildings at both places must date from the same period. Some of these resemblances in style are apparent in Mr. Curzon's photographs, and in the book which I am glad to hear he is going to publish, I hope he will notice, and attempt to account for them. From a hint which Mr. Fergusson gives in his descriptions of Pagan and Angkor, it may perhaps be possible to find the link in the architecture of Kashmir, though Mr. Fergusson, who had not himself seen either Pagan or Angkor, does not appear to have thought of connecting the styles of the two places, which indeed have many points of dissimilarity as well as of resemblance.

Mr. VERNEY: I am here as the only European representative of the Siamese legation, and did not intend to speak, but I have much pleasure in thanking Mr. Curzon for the lecture he has given. The Siamese, I should like to inform you, are very proud indeed of being the owners of such ruins as we have seen represented to-night, and endeavour to preserve them intact. Until recent years, I believe, the very existence of these ruins was unknown to Europeans; we have with us one of the first of those who photographed them. I believe that Frenchmen have also taken admirable photographs and brought back good accounts of those ruins. I think we all might say how extremely obliged we are for the admirable way and graphic manner in which Mr. Curzon has told us what he saw, and I only wish that many Englishmen would follow in his footsteps, and that they may bring back not only the accounts of the ruins they saw but a great interest in these eastern countries which can do both the east and west nothing but good.

The PRESIDENT: Mr. Curzon has described his paper as dull. Whatever else it was I do not think that any of you will have found it that. I myself, when I heard that he was going to address us, knew that the paper would be extremely instructive, but I also knew that Mr. Curzon held very severe views indeed about the inexpediency of introducing anything that might at all detract from the strictly scientific character of our proceedings. However, the fact that he should have given us not only a very informing but a very amusing address only proves that as he is strong he is also merciful, and I am convinced that you will all desire that I give him your most hearty thanks.

The Hon. GEORGE CURZON: It is very true that I confessed a strong and scrupulous regard for the scientific character of our proceedings and our papers. As a matter of fact, the paper, as it will appear in the *Journal*, is scientific to the point of intolerable dulness, and it was merely the stimulus of this charming audience that tempted me to some of those concessions that have ruffled the scientific soul of our president. One word only in answer to the observations made as to the resemblance of these ruins to those of a temple in Burma. I thank Mr. Bryce for having mentioned this, as I consider it extremely worthy of study, and if he can supply me with photographs of them I shall be obliged, as they well deserve examination before one forms conclusions about the ruins at Angkor. With regard to what Mr. Thomson has said, I have only to reply that the transport of great blocks of stone by people at remote periods has to me never been a matter of much surprise. It merely requires a bank of sand, rollers, a pulley, rope, and the application of manual labour, to transport and elevate a block of stone half the size of this theatre. The people who erected these buildings had an unlimited supply of manual labour, and four or five thousand men would accomplish as well, though not with the same economy of labour, what is now done by a 200–300 HP. engine. As regards the extent of the site, I did not mean to say that the whole of the ruins were comprised within a space of 20 miles, because I have seen them at Kwin-hon in Annam that is over a stretch of country 400 miles broad. As any student of the question

would know, I was speaking of the ruins of the capital, not confined to the main temple, but including a group of buildings as extensive as London. As regards date, Mr. Thomson doubts my inference, for it was not more than an inference. The earliest inscription dates from about 600 A.D., and there are several inscriptions of about 890 A.D. on the later buildings, whose character is not such as to lead one to believe that there can be more than two hundred years between them and the main body of the earlier remains. In the days when Mr. Thomson was there not one inscription had been deciphered at all. I am obliged to Mr. Verney for the kind part he took in the discussion, and I hope that under the care of the Government with which he is connected in this country, these ruins may be preserved; but while these ruins are so well looked after the Siamese Government does not meet its responsibilities with regard to the others, and I should like Mr. Verney to write a despatch to that Government, urging it to extend the same care to the other ruins.

NOTE ON MAP OF FRENCH INDO-CHINA AND SIAM.—The map to illustrate the paper by the Hon. G. N. Curzon has been reduced from the last edition of M. Pavie's map. As the question of the boundaries is still under discussion none but those which have previously been definitely settled are shown on the map, such for instance those between Cochin China and Cambodia, and China and Tongking. The topography differs considerably from that shown in the maps previously published. This is especially shown on the east side of Mekong as well as in the course of that river itself. The present map also contains a large amount of detail in districts previously left nearly blank.

THE ZOUTPANSBERG GOLDFIELDS IN THE SOUTH AFRICAN REPUBLIC.*

By FRED. JEPPE.

THE district of Zoutpansberg embraces an area of about 25,000 square miles. It forms the northern portion and about one-fifth of the whole of the South African Republic. Of this large territory, exceeding the area of Holland and Belgium put together, the proclaimed goldfields cover about 3564 square miles.

The district is bounded on the south by the Olifants River, on the east by the Portuguese possessions, limited by the Lebombo Range, on the north by the Limpopo, on the north-west by the Magalakwin or Nyl River, and a line from this river to Yzerberg, thence along the mountain range to the Inkumpi or Zebedeli's River, and down this river to its junction with the Olifants. The district is divided into two portions, the Western or Highveld, and the Eastern or Low Country; in the latter the principal goldfields are found. Two great mountain

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* Map, p. 288.

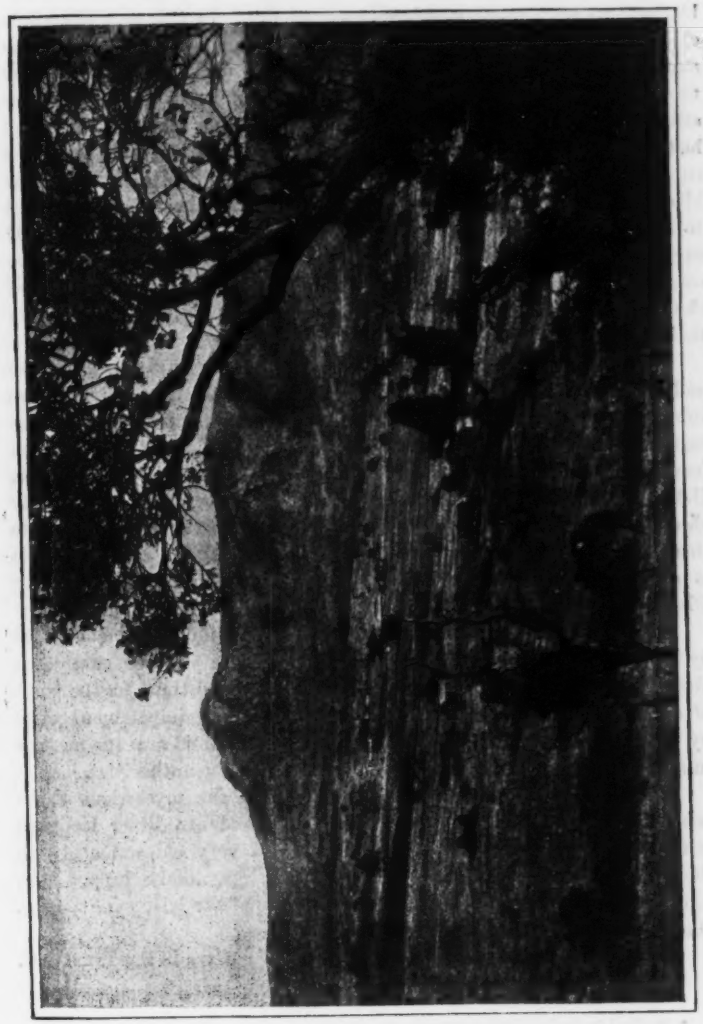
ranges, the Drakensberge * from south to north, and the Zoutpansberge from west to north-east, intersect the district. The Highveld is drained by the Zand and Hout Rivers, the Low Country by the Olifants, the Great, Middle and *Klein* Letaba and the Levubo with their numerous tributaries. The Levubo or Pafuri runs north-east and joins the Limpopo in lat. 22° 24′ 15″ S. and long. 31° 22′ 39″ E.† The three Letabas, united into one big river, join the Olifants in lat. 24° S. and long. 31° 52′ 49″ E.

The history of the first occupation of the district by the Boers, in 1848, under Hendrik Potgieter, who fought their way to the north, is full of thrilling incidents worthy of an ample record by the future historian of the Republic. Surrounded and opposed by powerful native tribes, a handful of brave pioneers pushed on to the north and established a village on the southern slope of the Zoutpansberge, named Schoemansdaal. Here the small community lived and flourished surrounded by hostile native tribes. Rita Montanha,‡ a Portuguese priest, who visited the village in 1855, mentions the number of dwellings as two hundred and seventy-eight, accommodating a population of one thousand eight hundred souls, of whom three hundred were fit to bear arms. They lived principally from the proceeds of their hunting trips into the interior, bartering ivory and skins for guns, ammunition, groceries, and other necessaries of life, with the Portuguese traders from the coast or with the inland merchants at Pretoria. In the year 1854, Hermanus Potgieter, a brother of Hendrik Potgieter, accompanied by his wife and children and some followers, were surprised by the natives at Moorddrift in Makapanspoort. The whole party was killed after being cruelly mutilated. When the news of these atrocities reached the authorities a *Commando* of Boers, consisting of five hundred men, under Piet Potgieter, Commissioner of Zoutpansberg, and M. W. Pretorius, of Potchefstroom, proceeded to Makapanspoort to revenge the murder of their relatives. The natives did not wait for the Boers, but fled into some large caves in the mountains; these were surrounded by the Boers in the hope that the natives would soon be forced to surrender for want of food and water. But it appears that the natives knew of some outlets unknown to the Boers, by which they managed to supply themselves with water. They held out for some time, but when Potgieter was fatally wounded, and the natives

* Dr. Rehmann says they ought not to be called "Drakensberge," but "Lechlababerge," as their geological formation is quite different from the Drakensberge at Lydenburg, consisting of much older metamorphic rocks. Dr. A. Rehmann, 'Das Transvaal Gebiet des südl. Afrika, in phys.-geog. Beziehung,' *Mitth. der k. k. geogr. Ges. in Wien.* Band xxvi., No. 8. 1883: pp. 377, 378.

† According to observation of Capt. A. Freire d'Andrade, member of the late Portuguese Boundary Commission.

‡ *Journal* R.G.S., Vol. XXXII. 1862, p. 63.



WOODBUSH VILLAGE AND THE MPOHME OR WOODBUSH MOUNTAIN.

openly defied the Boers, calling upon them to come and fetch them out of the caves, the Boers determined to make an end of the affair. All the approaches to the caves were filled up with large boulders, and blocked up with wood, which was set on fire. In this way the whole clan, numbering some fifteen hundred souls, except a few who managed to escape, were either starved to death or suffocated by the smoke. Numerous skeletons and heaps of bones and skulls may still be seen in the caves. But the terrible revenge taken by the Boers had little effect on the natives, who were conscious of their vast superiority in numbers. The strife between the white man and the black was kept up for years until, in 1869, the Government resolved to abandon Schoemansdaal for a time. The inhabitants removed their furniture and everything else that could be moved, and retired to the southern portion of the district. But the people living in the valleys of the north-eastern portion of the district, called Spelonken, remained on their farms.

With the exception of the tribes under the powerful Chief Magato and a few of his underchiefs, all the natives of the district have submitted to the supremacy of the Government, and agreed to pay taxes. These are under the Chiefs Matala, Malitze, Machichaan (successor to Maraba), Chuni, Mapashlela, Malip, Mamabul, Legalie, U-Matiba, Matok, Ramagoep, Zegop, Mojaje, Tabaan, and other petty chiefs of the Knobnoses or Magwambas. The territories assigned to these chiefs are called *Locations.** The location of the chief Zebedela is situated partly in the Zoutpansberg and partly in the Waterberg District, but has not been officially defined.

Negotiations are still pending with regard to the territory claimed by Magato, who occupies a stronghold in the Zoutpansberge, considered almost impregnable. The Republic has been several times on the point of deciding the dispute with this pugnacious and impertinent chief by force of arms, but the wish to avoid bloodshed and arrange matters in a peaceful manner has been predominant with the authorities.

Commandant Pretorius, who lately visited the mysterious chieftainess Mojaje, who is supposed to have furnished Mr. Rider Haggard with the subject for 'She,' describes her as a very old woman, with long, pointed, and crooked nose, long face, thin lips, closely-cropped hair, blue eyes, and almost white in colour. In spite of her bodily infirmities, she was received with great respect by the tribe.†

No proper census has ever been taken of the natives in the Transvaal.

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* Marked in dark stipple in the map.

† The old lady turns out to be an impostor, being put forward by the wily Indunas as the original Mojaje, who died many years ago. In this way the Indunas collect a considerable revenue from credulous natives, who pay liberally for rain, the old chieftainess having been a great rain-maker in her time.

According to the last estimate, the approximate number of the native tribes living within the limits of the district is 382,328, consisting of 79,071 grown-up males, 100,723 females, and 202,534 children. The two principal tribes are the Basutos or Makatis, and the Magwambas or Knobnoses, the latter about 75,000 strong. The tribes living in the Zoutpansberg range are estimated by the German missionaries at 100,000 souls.

The white population is put down by the last official census at 4668, of whom 2732 are males, and 1936 females, the density of white population being 0·186 per square mile.

Numerous travellers have visited the district mostly on their way to the interior; but large tracts of country on the Eastern border are unexplored and only known to the hunters, who visit this part of the country during the winter season to hunt buffaloes, giraffes, rhinoceroses, and even elephants, which are still found in these regions. But owing to the tsetse fly and poisonous plants, these hunting trips have to be done on foot or with donkeys.

Livingstone is the first traveller on record who visited the district, which he did in the forties, but he did not proceed further than Makapanspoort, and Gassiot* is the second who passed through the South-Western portion of the district in 1851, on his way to the Limpopo. Rita Montanha,† coming from Inhambane, visited the settlement at Zoutpansberg in 1855; Logegary, a French Missionary from Basuto Land, passed through the Marabasstad district on his way to Mapela in 1858; Merensky,‡ in search of the ruins of Zimbabwe, discovered by Mauch in 1871, explored the district in 1862; Mauch in 1868, on his way to the interior, and Elton§ in 1870, in his trip from the Tati settlement to Delagoa Bay, explored the southern bank of the Limpopo. In the same year Button explored the region of the present goldfields, and a year later discovered gold at Eersteling, near Marabasstad. In 1872, Erskine,‖ on his way from the Gasa country to Lydenburg, travelled along the banks of the Olifants River; Baines,¶ on his return from the Matabele country, crossed the Limpopo in lat. 22° 37′ 40″, and passed through Makapanspoort en route to Pretoria in 1870; Cohen** visited Marabasstad in 1873; Rehmann†† explored the district a few years later, describing its physical features in an exhaustive way never attempted by any other

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* *Journal* R.G.S., Vol. XXII. 1852, p. 136.

† *Journal* R.G.S., Vol. XXXII. 1862, p. 63.

‡ Erinnerungen aus dem Missionsleben, A. Merensky, 1888.

§ *Journal* R.G.S, Vol. XLII. 1872.

‖ *Journal* R.G.S., Vol. XLV. 1875, p. 45.

¶ 'The Goldfields of South Africa.' By T. Baines, London, 1877.

** 'Neues Jahrbuch fur Mineralogie,' etc., 1873.

†† 'Das Transvaal Gebiet des südl. Afrika,' *Mittheilungen der k. k. geogr. Ges. in Wien.* Band xxvi. 1883.

explorer; Raddatz,* who died at Yzerberg in 1890, explored the southern portion of the district in 1885; and last, not least, the Brothers P. and H. Berthoud,† during their long residence in the Spelonken, explored the district in all directions, and published the first sketch maps of the district.

Of all these Logegary, who travelled through the country in 1858 in search of thieves, who had stolen a large sum of money and six horses from him, was the first who discovered gold in the northern part of the Transvaal. In a private letter addressed to the Government Secretary of the Republic, written at Secheli's in October 1858, he reports the existence of two goldmines in the Transvaal, and states that he is in possession of twelve samples of quartz containing gold. He does not name the locality where he found them, but as he travelled through Sekukuni's country and the Marabasstad region to Mapela's Kraal, it must be assumed that he found the gold along this route. He wrote: "You may believe that if the English knew of this, nothing would stop them in their march to the Transvaal," and he continues, "wherever there is gold there is nothing but murders, and I will not have the blood of any man on my head." But the government of the time, for political reasons, and actuated by the fear of seeing the country overrun by all sorts and conditions of men, had no intention of making use of the discovery. In 1854, traces of gold had been discovered on the Jokeskei River by a man returned from Australia; but a notice had been published that making known the discovery of gold would be punished with a fine of £500.

In 1868, Mauch discovered gold on the northern bank of the Olifants River, and marked the spot in his map, published by Petermann in 1870, as a probable goldfield. A year later the intrepid explorer Edward Button, travelling through the Zoutpansberg district, discovered gold in the hills on the *Klein* Letaba, which he named Sutherland Hills, and proceeding southward, he discovered auriferous reefs in a double chain of hills, named by him the Murchison Range. As Button was the first discoverer of gold in the Murchison and *Klein* Letaba regions, it will not be uninteresting to condense here a portion of his report to Dr. Sutherland, in Natal, written from Lydenburg in 1870, placed at our disposal.

"In 1869, at the kraal of the Kafir chief Sebulaan,‡ I found his people busy forging picks, etc., from ore of good quality, which is mined in the vicinity of his kraals. About 12 miles to the south-east we came to a group of hills formed of metamorphosed schists. The strike of the rocks is the same as the direction of the ranges of

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* 'Das Kaffernland des unteren Olifant,' *Peterm. Mitt.* 1886.

† 'L'Afrique explorée et civilisée, Genève.' 1881, No. 8, and 1886, No. 10.

‡ Identical with Shivulaan on our map.

hills, viz.: west-south-west to east-north-east, true bearing, allowing 26° for variation. The strata are almost vertical; the dip, which is to the east, being hardly perceptible. The metamorphosed rocks in this group consist principally of chloritic and talcose slates, with numerous veins of quartz running through them, some of which are highly ferruginous. Intrusions of igneous rocks are also of frequent occurrence.

"We spent a few hours prospecting in one gully, found gold, but could not stay to make further explorations in this part of the country, the season being far advanced, and we also being short of provisions.

"Travelling thence south-east we found the gold-bearing belt to be flanked by gneiss, granite, and trappean rocks. The River Tabaan (Klein Letaba) appears to cut through the above-mentioned belt.

"Two days further on, after crossing the River Tabi (Great Letaba), we came to an enormous vein of quartz 150 feet wide, well cased in talcose slate, and towering some hundreds of feet above the plain. It forms a portion of another extensive chain of hills, and we named it Mountain Reef.* Travelling some miles over and across the strike of the beds of slate, we came upon porphyritic granite, with occasional narrow bands of chloritic slates, containing quartz veins and dykes of trap. Thence to the Palabora and Mashimala Hills, there is little variation in the rocks, the formation being essentially primitive. The Palabora country is rich in copper, and probably silver, tin, and other metals will be found there. Travelling several days through the Mashimala Hills, and crossing the River Selati, we emerged on the western side, thence to the River Makutzi, passing over extensive beds of talc schist, interstratified with bands of steatite, and occasional serpentine intrusions of igneous rocks. From the Makutzi to the Quathlamba gneiss and granite are the prevailing rocks. I returned to Lydenburg on October 8th, 1869.

"In June, 1870, I again left Lydenburg accompanied by a miner of twenty-five years' experience in New Zealand and Australia.

"At the point we crossed Olifants River, which is about 100 yards wide, we found fine gold in the crevices of the river-bed rock, also discovered an old working in a hill of chloritic slate, on the east bank, which from the stains around the shaft we concluded had been worked for copper. After crossing the Olifants we followed along its banks to the River Makutzi, passing some remarkable granite kopjes. Thence across extensive beds of what appear to be the oldest series of the metamorphic rocks, containing thick bands of quartzite, with some of the largest plates of talc I have seen in the country. We discovered no traces of gold here. Three days after crossing the River Selati, we came upon the auriferous chain of hills containing the Mountain Reef.

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* This hill must be the Witkop, or Witkoppies.—F. J.

"Our anticipations regarding the extent and importance of this mineral belt were fully realised by subsequent exploration.

"My attention having been directed to this part of the country through reading an address delivered by Sir R. Murchison to the Geographical Society, in which he expressed an opinion that the Limpopo country would prove to be auriferous, we concluded to name this chain of hills the Murchison Range.

"It consists of a double range of hills, trending in the same direction as the metamorphosed rocks of which they are composed.

"The strike and dip of the rocks is the same as the Sutherland Hills; the two belts being parallel, but separated by many miles of granitic rocks. The Murchison Range covers a considerable extent of country. We travelled upon the veld passing Mountain Reef, and arriving at the Tabi Valley, found that the slates, with the exception of a few isolated hills, had disappeared apparently; probably removed by the erosive action of the ancient river-course. The denuded rock is gneiss; but across the river the range again assumes the appearance of a chain of hills. I left the gold formation here."

Mr. Button, by adopting another route discovered the Eersteling Reef, near Marabasstad, in August 1871. This discovery caused President Burgers, who was then at the head of the Government, to appoint the first gold commissioner. Claims were pegged, and the first gold law (No. 1, 1871 *) was promulgated.

For some reason or other mining operations at Eersteling were not crowned with success. Powerful machinery was obtained from Europe and erected at great cost, but the water was found insufficient for the requirements of the battery. No satisfactory results were obtained; then the war broke out, in which the machinery was destroyed by the Boers. Operations have since been resumed by the Balkis Company.

In September 1887, a block of Government farms comprising 76,320 acres was proclaimed and set open under the name of the *Houtboschberg Delverijen* (Woodbushberg Diggings), and in the course of the same year the private farms Frischgewaagd, Hartebeestfontein, Mynhardtskraal, southern portion of Zandrivier (in which Marabasstad is situated), Waterval, Roodepoort en Deelkraal (on which Smitsdorp is established), and a strip of government ground adjoining Roodepoort, were proclaimed as the Marabasstad Goldfields. To these was added a portion of the private farm Cyferkuil, and later on the so-called Selati Goldfields, extending south to the Olifants River, east to the junction of the Selati with the Olifants and the junction of the Great and Klein Letabas. The last-mentioned fields include the Murchison

* The first mining Ord., No. 5, 1866, referred only to mining of lead, copper, iron, tin, and other base metals. In case of precious metals being found notice had to be given to Government.

THE SWOBLA PEAK, ZOUTPANSBERG.

Range. By the last proclamation of October 18th, 1892, the proclaimed territory has been extended to the north, beyond the Klein Letaba, as far as Rebanga.* This territory comprises six distinct goldfields known by the name of Smitsdorp, Houtboschberg, Thabine (between the Thabine and the Letsitele Rivers, both tributaries of the Great Letaba), Selati, Molototsi, and Klein Letaba. Officially these fields are now recognised under the name of the *Zoutpansberg Delverijen.*† The seat of the Gold Commissioner, formerly residing at Leydsdorp, has been removed to Pietersburg, but subordinate officials for the issue of licenses and other departmental work are placed at Leydsdorp, Haenertsburg, and at Birthday Camp, north of the Klein Letaba.

Smitsdorp, formerly the centre of a flourishing mining centre, is now almost deserted, after the removal of the Gold Commissioner to Pietersburg, the chief town of the district. Dr. Mathews, who lately passed through the village, met only three persons, the hotelkeeper, telegraph clerk, and a traveller.‡ *Pietersburg* is also the seat of the Landdrost of the district, whose office is combined with that of Gold Commissioner. It lies on the banks of the Sterkloop, a tributary of the Zand River, about 12 miles north of Smitsdorp, and was formerly called Upsala by the owner of the farm, who was of Swedish descent. It has three churches, two banks, decent public buildings, eight stores, about three hundred dwellings with about seven hundred inhabitants. It boasts also of a newspaper, called the *Zoutpansberg Review*, which was the most northern paper published in South Africa until the *Rhodesia Herald* was started at Fort Salisbury.

Marabasstad, the oldest settlement of the district and formerly the seat of the Landdrost, Haenertsburg, about 30 miles east of Pietersburg, Houtboschdorp, about 12 miles north of Haenertsburg, and Leydsdorp, about 50 miles east of Haenertsburg, all consist of a few houses only and some stores constructed of corrugated iron, or wattle and daub. New Agatha, close to Mamatola's kraal on Mafefere's mountain, completes the list of villages. It consists of a post and telegraph office, and a canteen. The old village of this name was laid out on the northern bank of the Thabine, but found too unhealthy.

All these places, except Houtboschdorp, are connected by telegraph,

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* This proclamation defines a much larger territory than is given in the map, including many private farms, occupation farms, and native locations, which are precluded by the same proclamation from the operation of the gold law. The whole of the eastern line of the goldfields from the junction of the Selati with the Olifants southward to Rebanga can only be given approximately, as no proper survey has been made.

† The following private farms have lately been proclaimed: Potsdam, Burgersdorp, with the celebrated Swiss Reef, Sedan, and Tours.

‡ Smitsdorp, says the *Review*, is now wakening up, and is all excitement in consequence of the hundreds of alluvial claims now being pegged on the farms Waterfall and Frischgewaagd.

and a telephone has lately been established between Agatha, Burgersdorp and Leydsdorp. The Birthday and Ellerton mines will also soon be connected with the general system.

The whole territory defined in the proclamation * consists of Government lands, except the private farms near Marabasstad and elsewhere, mentioned before. The remaining portion of the district, to the east of the proclaimed goldfields as far as the Lebombo, and to the north as far as the Limpopo, except, perhaps, a hundred private farms between Yzerberg and the Zoutpansberg range, is also government ground still unproclaimed as a goldfield, but the government have granted prospecting concessions, extending over two years, within the limits of this territory. Each concession comprises an area of about 200 square miles. Eight of these concessions have been amalgamated under the name of the Singwedsi Prospecting and Exploration Company.

It will be observed in the map that the line of the proclaimed goldfield passes through a portion of the locations granted to the Knobnoses and the chief Tabaan, which, like all other locations, are precluded from the operation of the gold law. Before the above-mentioned locations were beaconed off, a number of prospecting claims were pegged within their limits, and the owners of these claims are said to object to the ground being given to the natives. But the native chiefs, to whom the locations were allotted, have granted to certain parties prospecting and mining privileges on reefs that may be discovered within the limits of their locations.

In the year 1888–89, the time of the great boom, a rush took place to the Murchison Range. Hundreds of claims were pegged along the gold-belt extending from Leydsdorp to Witkop, a distance of more than 40 miles. The correspondent of a local paper, who visited the locality in 1889, described the working of about one hundred and twenty companies holding claims along the range as shown in Loveday's maps. Of these forty-four were still at work in June 1892. Mr. Sawyer † in his pamphlet gives the names of forty-five claim-holders that were working towards the end of 1891. The reason for this is not the absence of gold, but the great natural drawbacks, such as scarcity of water, great distance from the sea-coast, and consequent high cost of transport and provisions, the hot climate and risk of fever during the summer season.

But in spite of all these disadvantages, and the greater attraction and facilities of mining at the Rand, the Zoutpansberg fields are gradually and steadily gaining public attention. Old abandoned claims are being taken up and worked with greater energy, particularly since the great

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* Marked in yellow colour in the map.

† A. R. Sawyer, 'Geological and General Guide to the Murchison Range.' London, J. Heywood, 1892.

success that attended a mine on the Klein Letaba, and the sensation caused by the discovery of a rich antimony reef.* The Klein Letaba region offers exceptional advantages and facilities owing to its abundance of water and comparatively easy accessibility. The river runs through the auriferous region, and has, even in the dryest season, a sufficient supply of water to work the stamps. There is abundance of fuel, as the neighbouring country, in fact the whole of the low country, is thickly wooded, supplying firewood and any quantity of timber suitable for mining and building purposes. Mr. Sawyer, in his guide mentioned above, enumerates about twenty different kinds of woods, but the local names he gives are mostly incorrect.† A good number of other kinds, not mentioned by Mr. Sawyer, may be found in a list published by the writer ‡ in 1876.

There is an abundant supply of labour, as the Zoutpansberg district is the most densely peopled of all the districts of the Transvaal, its natives forming 59 per cent. of the total population of the country. The natives are respectful and obedient to the whites, supplying them with milk, butter, eggs, fowls, etc., on reasonable terms. Wages range from fifteen to twenty-five shillings per month, and the demand is small compared with the supply. The Rev. P. Berthoud divides the natives into two distinct races: the Basutos or Bavendas, speaking the Sesuto language, and the Magwambas speaking the Siguamba dialect. The latter fled from the east to escape the tyranny of the Amatonga chiefs living on the sea-coast. He calls the Magwambas a proud, unruly race like the Zulus, but very desirous of being taught. They wear a girdle made of skins with tails of wild animals attached, are very fond of feathers and ornaments; their war arms are shields of skins and assegais; human life has no value in their eyes. The Basutos are a gentle pastoral race, much more amiable than the Magwambas, but less eager to be educated.§

With regard to water-supply the Murchison Range is at great disadvantage compared to the Letaba region. The Melati is not a perennial stream, supplying water during the winter season in pools only, and the Selati River can only be reached by crossing the Spitzkop range. Boring and well-sinking has been resorted to. Mr. Sawyer says

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* Assays made of samples showing *no visible gold* gave 5 oz. 8 dwt. 18 gr. and other samples with *visible gold*, 18 oz. 12 dwt. 12 gr. per ton. The antimony contained in the ore consists of sulphide and oxide of antimony. The former is perfectly pure, and contains 71·40 per cent. with 28·60 per cent. sulphur, the latter 93·60 per cent. of oxide with 6·10 per cent. silicates.

† The correct names are Wachteenbietje, Wilde Druive, Waterboekenhout, Boekenhout, Swarthaak, Wilde Vyge, Kremartaat, Rooibosch, Knoppiesdoorn, etc.

‡ "Notes on some of the Physical and Geological Features of the Transvaal." By Fred Jeppe. *Journal* R.G.S., Vol. XLVII., 1877.

§ *Les Spelounken*, 'L'Afrique Explorée et Civilisée, Genève,' Ferrier, 1881, p. 163.

that at the La France mine water was obtained at a depth of 130 feet, and at the Renown, three miles north-east of Leydsdorp, sufficient water for thirty Kaffirs and some cattle was obtainable all the year round from some springs close by. But, he says, at most of the camps water has to be fetched from the Selati.* He speaks of the Roviwater (correctly Rooiwater) as a sluit containing water both in summer and winter, possibly the upper portion of the Melatie. Loveday's map shows a stream in the same position with the name Dwars River, but shows it as running west into the Thabine. It is said that there are no engineering difficulties in the construction of a canal from the junction of the Letsitele with the Great Letaba to the Murchison Range.

Mr. Halder, a mining engineer resident on the fields, says that the Great Letaba is a stream of 24,000 cubic feet in the winter season, and at some places there is a great fall. The average fall per mile over 60 miles of the Great Letaba is 21 feet, but for a few miles there is a fall of 60 feet per mile. The Selati River is useless for motive power.

Mr. Halder mentions that the Murchison Belt has been found by numerous hunters in Portuguese territory in the neighbourhood of Fraka (*Fiaca* is shown in the Portuguese maps on the left bank of the Limpopo, in lat. 23°).

The completion of the Selati Railway from Komati Poort to Leydsdorp will, no doubt, give a great impetus to the mining industry. This line, which was commenced some months ago and is pushed on with great energy by the Belgian engineers, will place the Zoutpansberg fields in direct communication with Delagoa Bay, a distance from Leydsdorp of 254 miles by rail. The line branches off from the first Transvaal station on the Portuguese border at Komati Poort, crosses the Limpopo River close to this station, and following the watershed between the Limpopo and Olifants Rivers crosses the latter near the junction of the Selati, and skirting the southern bank of this river approaches Leydsdorp from the south. This is the line as originally contemplated and surveyed. But as all the mines are situated between the two ranges, the Murchison and the Spitzkop, it has been resolved on the proposal of the State mining-engineer, Mr. Klimke, to bring the line nearer to the mines by crossing the Olifants River a little below the junction of the Selati, and by passing near the old mines of Palabora to bring the line between the two ranges to a point near Leydsdorp that is easy of access for future extension to the north and west.†

The observations on the geological features of the Murchison

* A. R. Sawyer, 'Geological and General Guide to the Murchison Range.' London, 1892: pp. 68, 69.

† The line may be extended to the farm of Tours.

Range quite confirm those made by Mr. Button in 1869. Mr. Alford * says:—

"The Murchison Hills are formed of the eroded remains of quartzose-clay shales, schists and mudstones, resting upon the granites and plentifully intercalated with quartz. Imbedded in them are masses of boulders of quartzite, the broken remains of what were probably once interstratified beds of that rock—the whole formation being very much broken and dislocated by frequent and large irruptions of trappean rocks. Gold occurs in the quartzite masses, in the intercalated quartz veins, and in many of the surface deposits with which the granite is covered. These deposits are often exceedingly rich, and many would pay well if worked out by a few industrious men with a very small expenditure of capital. In these rocks the gold does not appear to enter into the composition of the rock, as in the case of an ordinary mineralised quartz, but occurs in nuggety impregnations distinctly visible to the eye, and thus giving to the observer an idea of great richness which is sometimes not borne out on assay. The dip of the strata, where it is ascertainable, is to the south, the rocks having been upheaved from the north. From the position of the drift beds I also judge that the general direction of the denudation has been from the north and north-west."

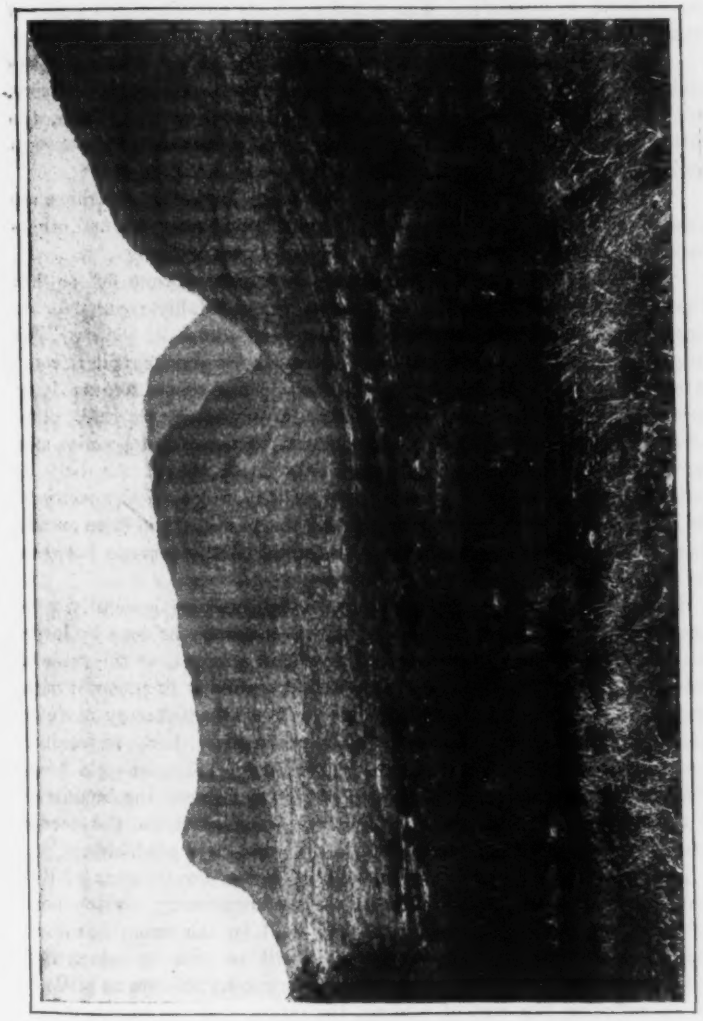
Mr. Sawyer † goes more into detail. He says:—

"The Murchison Range, or Selatie field, is the southern of three gold-bearing belts, running almost parallel in a south-west to north-east direction. The northern belt comprises the Klein Letaba goldfield. An intermediate small belt occurs north of the Molototsi River. The gold-bearing zone of the Murchison Range averages 6 miles in width and about 50 miles in length, from the Selatie gold mine to Witkopje. The Murchison Range consists of various crystalline and metamorphosed rocks of great age, including talc schist, chlorite schist, clay slate, clay (sometimes remarkably soft), talcose sandstone, fine-grained laminated sandstone, hornblende schist, tremolite schist, talcose schist, pink and green quartzites, calcareous sandstone, talcose limestone, grit, quartz-schist, and various others. . . .

"Numerous deposits of calcite and dolomite were found in the long tunnel at Shotover amongst the chlorite schists. Large quantities also occurred in the reefs there. Peculiar large nodules of fine-grained sandstone mixed with chlorite, which gave it a spotted appearance, were also found embedded within chlorite schists in that tunnel. They were enclosed in dark green chlorite, which was about 3 or 4 inches

* "Notes on an Expedition to Zoutpansberg," by C. F. Alford, F.G.S., *Witwatersrand Mining and Metallurgical Review*. See also 'Geological Features of the Transvaal,' by the same author. October, 1890. London, Edward Stanford, 1891.

† A. R. Sawyer, A.R.S.M., F.G.S., 'Geological and General Guide to the Murchison Range.' J. Heywood, London, 1892.



MANHOPI, EXTREME WESTERN TERMINATION OF ZOUTPANSBERG RANGE.

thick. One was lenticular, 32 inches in depth and 12 inches thick in the middle. The other was 4 feet in depth and 3 feet in width. It was in other respects similar, except that part of the sandstone had been altered to quartzite. The chlorite schists contain much oxide of iron, and consequently have a spotted appearance.

"The quartzites of which Spitzkop is composed are of various hues and texture. Some are foliated, others schistose; some are massive, without showing any lamination. The former are mostly green, the latter brown and black, with white quartz veins running through their mass.

"The quartzites forming part of the Lion Kopje at La France are similar in many respects, but some strata are quite sea-green and others rosy-red.

"These rocks have been tilted up at angles of from 60° to 90°. Their strike is parallel to the range, and is remarkably regular for its length, though these rocks are folded and contorted in places The range is bounded to the north and to the south by granite, and to some extent by gneiss. The felspar is usually white, and occurs frequently in large well-defined crystals, resembling those of the Land's End. The mica also occurs frequently in large flakes; fine-grained granite and pegmatite also occur. Granite also shows itself within the belt in various places, at a spot 3 miles north of Leydsdorp, to the south of the Daisy Claims, and a few miles west of the old Spitzkop store on the abandoned Horseshoe Claims. Granite and gneiss intervene between the three belts."

Mr. Sawyer does not see how the goldfield can be generally prospected by individuals. This, in his opinion, can only be done by large companies. Whilst individuals can only obtain results near the surface, which are often misleading, rich companies can afford to prospect on a large scale, and at fair depths, and this is the only satisfactory mode of doing so. The long grass makes surface prospecting almost impossible in summer, as rocks are hidden by it. Deposits of alluvial gold have hitherto been found in two or three places only, near the boundary of the farm Tours in the Drackensberg Range, and on the farms Frischgewaagd and Hartebeestfontein in the Smitsdorp goldfields.

Mr. Braecke, who has spent some time in the development of the Gravelotte Reef, says that in the future of the low country development and working of the gold-bearing veins, it will be the scientific miner who will obtain the best results, for he will be able to select the chutes of rich and payable ore, leaving the very low grade ore as pillars, and so reducing the cost of mining, timbering, and treatment, while increasing the return of metal per ton.

Mr. Braecke has sunk two shafts in the valley between the Murchison Range proper and the Spitzkop Mountain. These shafts are 500 feet apart, and in each case and at the same level, viz., about

50 feet into the bed rock, which consists of talcose and chloritic slates cut by dykes of porphyritic diorite, he obtained water in abundance.

Speaking of the Klein Letaba fields, Mr. Halder says: "The formation of the Sutherland Range is somewhat conformable with the Murchison Range, with the exception that the gold-bearing strata or slate belts are more broken by masses of intrusive dykes, and sometimes make prospecting rather difficult. In the Sutherland Hills the formation is beautifully stratified, giving distinct appearances of its strike. Some good properties have lately been discovered in the hills themselves. It may be safely stated that the slate belt or auriferous strata commences in the Drakensberg, some 20 miles west of the Ellerton mine." *

The Birthday Reef forms the centre of a large number of claims belonging to different small companies. Most of these have lately amalgamated into the Letaba Gold Mining Company.

The output of gold in the Zoutpansberg mines shows that mining is still done on a small scale compared to the brilliant results of the Rand and the steadily-increasing output of the Kaap goldfields. In 1890 the total output was 9480 oz. 12 dwts., and in 1892 16,107 oz. 18 dwts. The following table compiled from the official returns, published by the Mining Department, gives the results of the different Zoutpansberg goldfields during the year 1892:—

Goldfield.	Average Number of Men Employed.		Number of Stamps.	Tons			Gold obtained.	Value.
	White.	Colored.		Excavated.	Crushed.	Washed.		
							oz. dwts.	£
Marabasstad .	11	78	50	1,796	2740	770	1,023 9	3,582
Houtboschberg	4	23	45	19,391	311	—	372 11	1,303
Klein Letaba .	26	186	10	6,190	3869	—	14,693 16	51,428
Selatie . .	23	93	18	1,573	52	—	18 2	63
Total .	64	380	123	28,950	6972	770	16,107 18	56,376

The output for the entire Transvaal is given by the Chamber of Mines † as 1,325,394 oz. for the year 1892, comprised as follows:—

	oz.	dwts.
Witwatersrand	1,210,868	16
Kaap goldfields	63,125	3
Lydenburg	24,092	2
Carried Forward	1,298,086	1

* A reference to the map will show that, according to Mr. Klimke, the territory between the Drakensberg and the Ellerton mine is a gneiss formation without any indication of metallic veins.

† Fourth Annual Report by the Chamber of Mines, Johannesburg, for the year 1892.

	oz.	dwts.
Brought Forward	1,298,086	1
Zoutpansberg	16,107	18*
Klerksdorp and Potchefstroom	8,967	17
Malmanie	2,060	19
Vryheid	81	10
Total	1,325,304	5

Value .. .. £4,638,880.

Besides gold the district is rich in other ores, such as iron and copper, also lead, and probably silver and tin. The two former metals are worked by the natives in a crude, primitive fashion. The furnaces in which the ores are smelted are made of clay a few feet above the ground, of square or circular shape, with a slot on one side. Through this aperture an earthenware pipe is inserted, attached to bellows made of skins, by which the blast is applied to the furnace. Out of the iron assegais, hatchets, and other weapons, and hoes for tilling the land, are made. The copper is worked into bangles and other ornaments worn round the neck, wrists, and ankles.

In the Palabora district extensive old workings are found in the Umhululu or Lole Mountains, with deep shafts surrounded by piles of *débris* and slag. The workings must be very old, as big trees are growing in some of the holes. A recent traveller thus describes the old workings:—

"Above the prevailing flatness of the land rise weird, uncanny-looking kopjes of granite and syenite, of grey and red and green; sometimes alone, sometimes in groups of three and more, clad with thick bush about the base, and flaunting huge weathered masses of strangely-shaped rocks on high.

"A gentle rise of 200 or 300 feet brings one to a small intermontanic creek, immediately above which one sees the first of the much-talked-of workings. From here, right up to the neck, and then along the greater axis of the hill, north and south, over the crest and all down the eastern side, here, there, and everywhere are holes and cuttings, shafts and tunnels, of all sizes and shapes. The hills are well mineralised, and in more than one zone, so that no attempt to find ore on the part of the workers has been altogether unfruitful. No systematic plan has been followed, and although a rough attempt has been made to follow the main outcrop on the crest of the hills, the chief idea has evidently been to get ores wherever there was the slightest opportunity offering.

"There are dozens and dozens of holes, mere circular pans, a foot or two deep and a yard or two in diameter; there are shafts twenty

* Of which the Birthday shared 13,618 oz. 5 dwts.

feet deep; cuttings of several score of yards in length, and 25 to 30 feet in depth; there are tunnels—not many it is true, but one or two of small dimensions and doubtful utility—and there are piles of *débris* wherever one turns. Thousands upon thousands of tons of ore have been removed; hundreds of hands, in the aggregate, must, at some time or other, have been scraping and digging and hammering away at countless points upon the hill of Lole.

"The gangue of the ores appears to be of calcspar and a silico-calcareous rock; it is very white and compact, and glistens and gleams in the bright sunshine like purest crystal. The ores are many, and, at the present time, have not been fully determined, so that caution prevents one from stating definitely what they are. Magnetic iron ore is in great quantity; manganese is to be found; copper sulphides, carbonates and silicates occur in small nests and thin veins; a little copper oxide (cuprite) has been found, and pretty specimens of a copper or uranium mica are to be obtained in many places. Other minerals may be ascertained when careful analyses have been made."

A short time ago some sensation was caused by the discovery of mercury on the farm Doornfontein, near Pienaars Nek. The metal is said to occur in its native state in vast beds of ore covering over a square mile of ground. The dip of the beds is at an angle of about 45°. The theory, as set forth by a writer in a local paper who visited the spot, is, that this porous honeycomb rock has been thus largely impregnated with quicksilver by volatilisation from beds just beneath the immediate surface, the sandy ore acting as a condenser. A syndicate has been formed to open up the property. The ore was, it is said, discovered on this and the neighbouring farm Schaapplaats by Mauch in 1867, in one of his journeys to the north.

Professor Cohen in his exploration of Marabasstad in 1872, mentions the discovery of a small vein of pure silver.

Rumours of the discovery of diamonds in different parts of the Zoutpansberg district have been heard for years. In the neighbourhood of the great Saltpan on the western extremity of the Zoutpansberg Range, a little beyond the margin of our map, prospecting for diamonds was carried on by experts from Kimberley, but without any satisfactory results being achieved. The soil within a radius of 10 miles from the Saltpan was considered identical with the blue ground of Kimberley. Small diamonds were actually found, but the search was abandoned for a time, the prospectors being convinced that the matrix would be discovered one day.

Although the district offers exceptional facilities for agricultural pursuits, the farming population is the most poverty-stricken, indolent, and unproductive of the whole country. All breadstuffs have to be imported at great cost over bad and dangerous roads, which, of course, is a great drawback to the mining industry. The original voortrekker looks

with suspicion on the new comer, who disturbs the even tenor of his sluggish existence. He has no enterprise or ambition. He grows hardly as much as he wants for his own consumption, and spends the best part of the year in the *Jagdveld*. The rich alluvial soil of the valleys in the Spelonken is admirably fitted for the growth of coffee, sugar, and other tropical products; but few attempts have been made on a large scale. There is an abundance of water from the numerous tributaries of the Levubo and Klein Letaba.

The habitations of the European residents of the Spelonken are however, well cultivated, such as the homesteads of the Swiss missionaries P. and H. Berthoud, at Waterfall (Elim) and Valdezia, and especially the beautiful estate Lovedale Park, belonging to Mr. Cooksley. The farm Goedewensch, below the slopes of Pisang Kop, the residence of the late Portuguese Consul Albassini, was formerly considered one of the finest properties of the Spelonken, where coffee trees and other tropical products were cultivated; but since the death of the Consul the estate has been greatly neglected. A new township, to be called Maréville, is now to be laid out on the farm.

The unhealthiness of the climate during the summer months is also a great drawback to the development of the district. Fever was particularly bad last season, but it has not been confined to the Zoutpansberg district only. On the railway works in the Elands Valley and near Barberton fever has been exceptionally virulent, taking away people in prime of life, and causing great distress. Speaking of Klein Letaba, Dr. Mathews,* who lately visited the camp, thinks that exaggerated reports of the mortality occurring there had gained too much credence. The deaths up to the time of his visit had been among those living more or less precariously and carelessly, only one man in the Company having died. He says the sickness, nevertheless, is excessive, the doctors and others informing him that, with the exception of the manager, not one single man employed on the mine had escaped an attack of fever more or less severe. Though mining in the tropics, he found that the men did not present the washed-out appearance of Anglo-Indians, and all were in capital spirits.

Mr. Sawyer, who lived two years on the Murchison Range, informs us that the climate during the winter is pleasant and healthy; there is little rain, the days are hot but the nights cold. Great changes of temperature are experienced at all seasons, which, without proper precautions, cause fever and other sickness. During October, 1890, the rainfall was 1·60 inches, the lowest minimum temperature at night 51° F., the highest, 67°. In November the total rainfall was 5·05 inches, and the average temperature during the day 107°. In December 2·41 inches of rain fell, and the average temperature for that month and January

* Author of 'Incwadi Yama.'

ELAND'S KOPJES, DUUR-EN-DUUR.

was 106°; 9·89 inches of rain fell during January. In February, 1891, the heat was excessive, the maximum temperature during the day ranging from 134° to 85°, the average being 114°·8; 14·87 inches of rain were registered during this month. In March there fell 1·87 inches only, and the average temperature was much reduced. There was hardly any rain in April (0·2), the average temperature during the day being 108°, during the night, 49°.* Mr. Sawyer holds that, though there is danger of catching fever during the rainy season, immunity can be secured by attention to ordinary rules of health, by retiring at sunset, not rising too early, abstaining from spirituous liquors, and choosing a high residence. He lived near Leydsdorp during the summers of 1891 and 1892 without getting a touch of fever, and quotes instances of Europeans living there for years without being attacked. Mr. Sawyer maintains that when the long grass† is regularly burnt down fever will become practically non-existent. The fever is said to be a climateric intermittent fever, not strictly malarial, like that contracted in other parts of the district, and rarely proves fatal if proper attention is given.

The scenery of the Low Country is grand and beautiful when it bursts upon the weary traveller after passing the dreary, monotonous plains that intervene between Pietersburg and the Drakensberg Range.

Standing on the brink of the range where the road leads down to Buffels Kraal, on a long spur of the mountain, a glorious view is obtained of a large stretch of the Low Country as far as the Lebombo or Longwe Range to the east. The whole basin seems one endless mass of bush, broken here and there by small mountain ranges and single kopjes, peeping out like islands in the sea. The road leading through the bush reminds one of an English park, were it not that the big ant-heaps, the unwieldy baobab, and picturesque euphorbia, remind the traveller that he is in South Africa. Looking back towards the west after descending the road, the mountain range towers above like a gigantic wall with castellated krantzes and deep bush-clad ravines. No towns or villages meet the eye, not even the elephants which according to Swift took their places in the maps, the solitary homestead of a farm with a few acres of cultivated ground, or a Kaffir kraal with naked, dirty children and barking dogs playing about, is passed at long intervals. Nothing disturbs the vast solitude but the flutter of bright-coloured birds or the rush of the light-footed buck as he speeds through the bush. The ravines are thickly covered with rank vegetation growing with tropical luxuriance. Ferns are found here in great variety, from the big tree-fern to the tiny maidenhair,

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* The author does not mention how these averages were obtained. The figures of temperature must consequently be received with great caution; the true shade-temperature would probably be considerably lower.—Ed.

† He quotes an instance where he found grass of 15 feet high near the Thabine.

interspersed with bright-coloured wild flowers. Birds of brilliant blue and red plumage flutter among the branches of the acacias, which are festooned with creepers in dark and light green; troops of monkeys gambol chattering among the rocks and trees.

"But this bright scene of fairyland is not without its shadows. Horse sickness prevails in these valleys, and the deadly *Tsetse* is found in some parts. The bright carpet under our feet contains poisonous herbs, fatal to cattle, among the lovely ferns and shrubs lurks the venomous snake ready to leap upon the intruder, on the branches of the trees crouches the vicious leopard watching for his prey. The bright-coloured flowers have no scent, the brilliant-plumaged birds no song."

The views obtained in some of these bushy ravines are extremely beautiful. The ubiquitous photographer has already picked out some of these scenes with the genius of an artist. The views taken by Messrs. Gros and Exton in these parts are selected with true artistic taste and skill.

There is a strange fascination in the South African landscape. The plains could not perhaps be compared with the vast American prairies, nor the mountains vie in grandeur with the Alps, but there is a peculiar charm which strikes the new comer when seen at first, and of which the old inhabitants never tire. Mr. P. Berthoud, a native of Switzerland, in speaking of the Zoutpansberg mountains, says in his paper quoted before,* that they recall the Jura rather than the Alps.

The cartographer has the same difficulty here as elsewhere in choosing the names of rivers, mountains, and localities, as so many different names exist for each. This is partly due to the nationality of the traveller or explorer, and partly to the different dialects used by the native tribes inhabiting the district. According to the decision of the Geographical Congress at Paris in 1889, new names are to be given only in the absence of native names, but the difficulty with regard to the old names remains: whether to adopt the version of the Makatis or that given by the Magwambas. And to make it more difficult some of the names given by the Bangais when they inhabited the country are still used by both the Makatis and Magwambas. There is also a great difference in the way native names are written by the German missionaries and those given by the Swiss missionaries, as will be observed if Berthoud's map of 1886 is compared with Knothe's map of 1889, published in *Petermanns Mitteilungen* in 1890, and Raddatz's map published in 1886.

Mr. H. Berthoud, who has been living at Valdezia for more than twelve years among the Knobnoses, says the German missionaries use the *w* not as the English but as the German *w*, which is a real consonant, a pure labial—not dento-labial sound. He also

* "Les Spelounken." 'L'Afrique Explorée et Civilisée,' Genève, Fevrier, 1881.

shows that there are sounds in the native language like the *w*, that have no correlative sound in the European languages. Thus *Ngoa* of the German missionaries is written *Ṅiva*, the *ṅ* being the guttural *n* according to the standard alphabet of Lepsius, adopted by nearly all the mission societies. Thus the *Ng* is one sound *ṅ*, the *n* guttural, and not two sounds *n* and *g*. Lake Ngami ought to be written *Ṅami*, Shoshong *Šošon*. But as it is difficult to adopt these letters in print, we are obliged to translate native names into common language, and here the differences are often very great.

Some travellers make the consonants harder than they are, like the Germans; English travellers write mostly phonetically,* but sometimes according to no rule at all but their own sweet will. The *Observation Hill* of Loveday's map is called Shirulurulu by the natives, and they have two hills of this name close together, calling the one the Shirulurulu of home, and the other the Shirulurulu of up-country. Now which of the two is Observation Hill, and how many hills are there in that part of the country from which observations might be made? Another instance is the river called *Mosunguludzi* by the natives, a branch of the Middle Letaba, to which the Boers have given the horrid name *Brandboontjes*. The range of hills named *Diorite* or *Black Hills* on all maps is called *Molembye* by the natives.

The following are some instances of the different names given to one and the same locality:—

Makatise.	Magwambas.	Local Dutch.
Ningo-e-Kolo . . .	Yingwekulu	Yzerberg.
Shingwedsi . . .	Molotsi, Madzororo	Singwedsi R.
Maila	Navangwe, Mamaila . . .	Mahila's Kop.
Limvubu	Lebvubye, Rebvubye, Omvobo	Letsobo, Pafuri R.
Shikundo	Tshikundo, Tsukundo . . .	Chicundo Kop.
Revanga	Phukane. (There are three of this name.)	. . .
Li-Thaba	Lehlaba, Lechlaba, Lethaba .	Letaba or Taba R.
Salatie	Sanandu, Shalate	Silatie or Selati R.
Lepelle	Lepalule or Rembelule . . .	Olifants R.
Motyatyi	Matyatye	Modjadje.
Mpalaora	Phala-Boroa, Palaboroa . .	Palabora.
Libomba	Lebombo, Ribombo, Longwe .	Rooirand.
Timperbati . . .	Timbabati, Timbati. . . .	Babati R.

In the writer's opinion the safest plan would be for all cartographers of these parts to adopt the old native names, *i.e.*, the name given by the first natives living in the immediate neighbourhood, and to write these names in letters known to all nations, without any diacritical marks. New names to be given only where no native

* As an example we may quote the local names given to the trees of the district by Mr. Sawyer on p. 37 of his book. They are evidently written according to sound, but are grammatically incorrect. Mr. Alford makes similar mistakes in the names of places like Moorddrift, Haenertsburg, etc.

names exist, and then only such as are in general use, known to the whole district. Dr. Raddatz* says that a knowledge of the native language is always a good guide to the traveller, and prevents mistakes made in maps in the run of tributaries to larger rivers. Thus a want of knowledge of the native language made the Ohrigstad River a tributary of the Steelpoost (Tubatse), while its native name Molatsinoana showed that it was a tributary of the Molatsi or Blyde River, the natives being in the habit of giving tributaries the dimunitive of the main river (Tubatse = Tubatsana). In his map he gives a key to the proper pronunciation of the Sesuto dialect in the German language.

Two main roads lead from Pretoria to Zoutpansberg. Of these the so-called Pan road, along the Elands River *viâ* Zebedeli's Kraal, through Strydpoort, Smitsdorp, Pietersburg to Haenertsburg and Leydsdorp, is the shorter of the two; but between Elands River and Zebedeli's water is obtainable only at one place. The distance from Pretoria to Leydsdorp by this route is 260 miles. The other route, taken by the passenger coach, leads past the Warmbath, Nylstroom, Makapanspoort, Pietpotgieters Rust, Smitsdorp, and Marabasstad to Pietersburg. The distance by this road is 280 miles. From Pietersburg the coach goes *viâ* Buffels Kraal, Dadelfontein, and the Ellerton mine to the Birthday mine, a distance of 298 miles from Pretoria, in four days' travelling. Another road leads from Pietersburg through Rhenoster Poort to the Klein Spelonken, a distance of 85 miles. The mail along this route is carried by natives. The route to Tuli Camp, Mashonaland, passes through Malitzie's location, Rieta Hill, Witklip, and Tatsani, crossing the Limpopo about 13 miles below the junction of the Macloutse. The mails are carried by comfortable passenger coaches in three days from Pietersburg to Tuli Camp, a distance of 170 miles.

Owing to the easy access and other greater attractions of the Rand goldfields, and other causes indicated above, the Zoutpansberg fields have been rather neglected; but the advent of the railway now in course of construction will greatly contribute to open up the district. Only a small portion of the district is known as yet, and that portion very superficially. Every day new discoveries are made.

NOTE.—After the map to illustrate this paper was printed, corrections were sent by the author on two tracings. The first of these has reference to the extent of the proclaimed goldfields in the neighbourhood of the sources of the Shingwedsi River, the principal alteration being in the northern boundary which now runs in a direct line from Shirindi to Rebenga. The other correction has reference to a change in the boundaries of the goldfields near the sources of Molondotsi River, which, however, are not of any great importance.

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* Dr. H. Raddatz, "Das Kaffernland des Unteren Olifant." *Petermanns Mitteilungen*, 1886, Heft 2.

THE STAIRS EXPEDITION TO KATANGALAND.*

By JOSEPH A. MOLONEY, L.R.C.P., Medical Officer to the Expedition.

In the spring of 1891 the Katanga Company, an international syndicate with headquarters at Brussels, signed a convention with the Congo State whereby it obtained certain preferential rights over the mines reported to be situated in the countries of Katanga and Urua, together with a third of the public domain, provided a valid occupation of these territories was effected within three years.

The work of the various expeditions of the Katanga Company has been already referred to in some little detail in these pages, and the full narrative of Captain Stairs' Expedition has been published by Dr. Moloney in his book 'With Stairs to Katanga.' The following is Dr. Moloney's address to the Society in a slightly condensed form.

The Katanga Company's expedition under the command of Captain Stairs landed at Bagamoyo on June 27th, 1891. Captain Bodson was second in command, the Marquis de Bonchamps was third, Dr. Moloney medical officer, and Thomas Robinson carpenter. The native caravan numbered three hundred and thirty-six. They marched through Mpwapwa, Tabora, the Ugunda and Ugalla countries, for some time in company with Captain Jacques' Anti-slavery Caravan, and on October 9th encamped at the French mission station, Karema, on the eastern shore of Lake Tanganyika, where, despite its advantageous position on the lake, no trace of German rule existed. From this point the journey assumed a new character, passing into scarcely-known territory, and must be described in Dr. Moloney's words.

There is a phenomenon connected with the lake which may well claim attention. From one of the Fathers we learnt the curious fact that the fort, which is now ¾ mile from the water, formerly stood at its edge. The level, it appeared, has sunk owing to the breaking down of the bar at the mouth of the Lukugu, which river drains Tanganyika from its western side. This dam forms periodically from silted sand and vegetation, causing the lake to ascend until the pressure bursts through the accumulation, when a subsidence follows. The rise and fall covers in all probability some fifteen years, and the extreme difference of level must be over 18 feet. Captain Stairs discussed this question with a very intelligent native, some fifty-five years old, who told him twice within his experience had the waters sank and once had they risen. He anticipated that they would begin to mount again in two years' time. We also ascertained that a half-knot current sets along the western shore of Tanganyika towards the mouth of the river from the north and south.

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* Abstract of paper read at the Royal Geographical Society, June 5th, 1893. Reference may be made to the map of the Katanga Company's territory, Vol. I., p. 288, and to the map of British Central Africa, p. 192.

The passage of Tanganyika was accomplished in most primitive *dhows*, and the winds proving contrary, much valuable time ran to waste.

On October 31st we started for the third and final stage of our pilgrimage. A steep climb brought us to the village of Manda, situated about 5 miles from Lake Tanganyika, and some 1000 feet above its level. We were thus in the midst of the mountains which border the western side of the lake with Mrumbi as their highest peak. On November 3rd we found ourselves at a height of 5000 feet near the village of Kaomba, situated among the Makololo mountains. There is little doubt that the rocks here are peculiarly rich in minerals, and may become a source of wealth to future generations of Europeans. At Kaomba itself iron exists in considerable quantities and in a very pure condition usually as red hæmatite. Hence the village is famed for its foundries, in which hoes, axes, and spear-heads are fashioned. These edifices are built with high conical tops and contain pits about 18 feet by 6 feet, and shallower at one end than the other. The furnace is made of clay and the blast is produced by some twenty bellows composed of two parallel wooden tubes fitting into one nozzle, which is smeared with clay to resist the fire. These pipes are fitted with sticks which are held in either hand and worked up and down like pistons. The smithies are open sheds with stone anvils and hammers, the last devoid of handles. There the smelted iron is made into implements, or into masses weighing from 2 lbs. to 2½ lbs., which are carried about for sale. These lumps resemble a very fat cigar in shape, and have a small rod projecting from either end. As for the implements, they appear rude enough to the European eye; at the same time they are admirably balanced, and with a Murungu axe a native will cut, or rather dig through a thick tree-trunk with great rapidity.

A half-caste slave-dealer, Makatuba by name, the factotum of a rich Zanzibar merchant, had passed through Murungu some weeks previously, and signs of his progress were to be seen on every side in the shape of burnt and deserted villages. In one week we saw no less than six in absolute ruins. The porters were much alarmed when on November 4th we passed within a few miles of the scoundrel's permanent camp, but fortunately he considered us too strong for attack.

On the 8th we crossed the Lufuko, a river some 30 yards wide and thigh-deep, with a current of 2½ miles an hour. This stream flows into Lake Tanganyika near Mpala. In the valley were trees of hard close-grained timber which would form excellent material for the construction of canoes. Some smaller trees were covered with a round fruit about the size of a plum, whose bitter skin enclosed four triangular kernels of a peculiarly sweet flavour. Here the mountains end, and with them Murungu, for the adjacent district, though assigned to Murungu in the maps, should really be called Kipemba. We crossed a low range of hills near the village of Makawele and arrived at the Ludifwa, a rapid

stream some 18 yards broad, which runs into the Lufunso and so into the Lualaba.

This country is very fine, and suitable alike to pasturage or agriculture. It is covered in parts with tropical forests in which the creepers and ferns reminded Captain Stairs of the Aruwimi uplands traversed by the Emin Relief Expedition. Some of the first marches were through swamps, and the vegetation consisted chiefly of dwarf bamboo, though the more open spaces were covered with herbage and flowers. But we soon entered upon an undulating prairie-land, in which the highlands could pasture any amount of cattle, while the valleys, with their thick beds of vegetable mould, would grow rice and the vegetables produced by the natives, such as manioc, maize, and matamah. Irrigation would be unnecessary, since the plateau is traversed by streams of clear water which, according to the natives, remain unexhausted in the dry season. From its altitude, some 4200 feet above the sea-level, it should be habitable by a European population. The rainy season is said to last five months.

Makatuba had visited this district also, and in consequence, for five days we did not pass a single inhabited village. On the 8th, however, we came across a retired colony which had escaped the scoundrel's raids. The people were a fine and intelligent-looking race, and though the men smeared their heads with a noxious concoction of red clay and grease, the women dressed their heads very becomingly with beads of various colours. They are great hunters, and organise large drives in which the game, which includes elephants, is urged towards some twenty pits dug in a pathway about a quarter of a mile long, let us say, by 20 feet wide.

On the 12th we descended upon the Lufunso, a tributary of the Lualaba. The current runs very fast and the water is waist-deep and 30 yards wide. A rope was thrown across, and the passage was effected without mishap. That night we encamped on the banks of the Lualaba in latitude 8° 9′ 44″ S. and longitude 29° 6′ 45″ E., and about 15 miles or two short marches north of Lake Moero. Here we remained until the 19th, so as to give our messengers time to reach Msiri with a letter from Captain Stairs. During this interval Captain Stairs succeeded in settling a long standing quarrel between Ngwena, a chief who dwells upon an island in the river, and his powerful neighbour Mpweto, who hails from the north of Lake Moero. After a most protracted *shauri* the dispute, which originated in the theft of a goat, was composed, and next day both potentates accepted the Belgian flag. We were able to ascertain some important facts about the Lualaba, partly by soundings, and partly from information acquired from two intelligent Arabs, Kafindo and Uturutu. The first impression, that of a volume of deep water, proved to be an entire misconception. The river is very wide, its breadth varying from half

a mile to a mile, but, though 30 feet deep in parts, sharp dentated rocks were to be found within a few feet of the surface. In fact, we were told that an experienced native could cross without getting wet above the waist. In no place did the Lualaba appear navigable except for canoes of the shallowest draught. We discovered a low cascade about 5 miles up-stream, and 2½ miles further on the channel became impeded by numerous wooded islands, beyond which were rapids quite three quarters of a mile wide. The natives told us that only one opening was navigable except in January, and I may mention that the rise during the rainy season is very slight compared with most African rivers. This appears the more remarkable because in Kipemba and Murungu, which drains into the Lualaba, it rains for five months in the year, and so great is the downpour that the natives can only grow one harvest.

As to the subsequent course of the river we learnt from Kafindo that for seven long marches it tumbles northward in a succession of rapids varied by two considerable cataracts. This statement can easily be credited, when one remembers that at Ngwena's the stream was 2800 feet above the sea-level, and that at Nyangwe, where Commander Cameron crossed, it is only 2300 feet. The distance between the two places is about 400 miles, so that the drop must be over 13 inches to the mile The Arabs reported that fifteen marches or some 120 miles to the north-north-west of Ngwena's the river joins Msiri's Lualaba, otherwise known as the Kamalundo, and that the united stream, yet five marches (40 miles) further on meets the Lukugu, flowing from Lake Tanganyika. This information has been confirmed by M. Delcommune's expedition. Having effected the passage of the Lualaba in our steel boats and some canoes supplied by Ngwena, we ascended a spur of the Urua Mountain 570 feet high. The topmost peaks rose some 850 feet above our heads, and were covered with trees. Great quantities of buffalo frequented the lower slopes, and a cow and her calf put the whole expedition to rout by an unexpected charge. On the 22nd and 23rd we marched along the Luvule, which river joins the Lualaba, between Ngwena's and Mpweto's. Thence we diverged into the valleys or oozes of which Livingstone speaks, and on one of them known as the plain of Chewella we had some excellent sport with buffalo and Vardoni antelope. I observe that on some of the Belgian maps the depression is coloured as if it were a lake; but though it becomes, as we had subsequent reason to know, a pestiferous swamp in winter, we walked in November upon smiling meadow-land.

The Luvule was crossed on November 27th at Kifambula's village, and we ascended a mountain range separating the eastern and western water-systems of the two Lualabas. Its altitude is some 4000 feet, and the Valley of Gera to the west has a rich black soil, in which sugar-cane and rice would flourish, as also the plain of Kissinga near the sources of

the Luvule. We heard, however, that to the south-west there is little water to be found in the dry season. Keeping along the bottom of this trough, so to speak, we passed through scattered forest varied by rivers. The Mpango, Luiki, and Luizi are tributaries of the Luvua, which runs into the Lufira, which is a tributary of the Kamalundo or Western Lualaba. Away to the south-east lies the mighty plateau of Konde Rungo, rising some 2700 feet above the plains of the Luvua and Lufira, and stretching to lat. 11° 20′ S.

The Luvua itself we traversed near Kifuntwe's by means of a wooden bridge, and two days afterwards (on December 9th) we struck the stream again at the point of its junction with the Lufira 2952 feet above the sea-level. This last is a river some 40 feet deep, about 45 yards wide, and with a current of 2 miles an hour. It has cut a channel about 30 feet below the surface of the plain, over which it describes the most capricious meanderings. We descended the red clay banks and put together the boats for crossing that day. This was our last passage, as we only marched along the banks of the Lukulwé, which joins the Lufira on its right bank. Like the main stream, it has dug a deep bed in the surrounding plain, and is quite 35 feet deep, and swarming with crocodiles.

As we drew near Msiri's it became evident that famine stared us in the face. Fortunately game abounded so that the porters were not absolutely destitute of food. Still on an occasion they went hungry for eight-and-forty hours, and in addition violent thunderstorms, accompanied by fearful gales of wind, used to put out the fires night after night. And yet the soil seemed fertile enough, while large fields, planted with Indian corn, mhoga, and viazi testified to the natives' industry. The scarcity was due to plundering by Msiri's warriors. Everywhere we were hailed as deliverers, and in no case did Captain Stairs encounter the smallest reluctance to accept the Congo flag. Many of the smaller villages were absolutely deserted, and even the important chief Kifambula had been compelled to shift his homestead.

On December 14th we encamped within a mile of Bunkeia, Msiri's capital. Our journey from Bagamoyo had taken five months and ten days, during which we had made one hundred and twenty marches averaging 9 miles each. This we believed to be a "record" performance in African travel; but the situation with which Captain Stairs had to deal can only be described as desperate. Clearly the empire which the Wanyamwesi adventurer had founded some thirty years before was fast crumbling to pieces. Msiri's authority was practically confined to the valley, some 14 miles square, in which Bunkeia stands, and the approaches to the capital were absolutely denuded of live stock, while the fields remained uncultivated.

Hence Captain Stairs had to make quick work; more especially as we were daily expecting the arrival of the South African Company's

Expedition under Mr. Joseph Thomson. At the same time he was hampered by the presence of three English missionaries, Messrs. Crauford, Lane, and Thompson, with whom it would have gone hard in case of hostilities. However, they were soon out of harm's way in the fort built by the Belgian officer, M. Legat, upon the Lifoi some 20 miles away. After two unfruitful palavers with Msiri, Captain Stairs took the law into his own hands and hoisted the Belgian flag upon the hill behind Bunkeia. The king, however, declined to make "blood brotherhood," and escaped by night to a large village called Munema, about 3 miles away. Captain Bodson and the Marquis de Bonchamps were despatched to take him prisoner, whereupon a fracas ensued in which Captain Bodson shot Msiri in self-defence, but was himself killed by one of the king's slaves. The natives fled, and the Zanzibaris promptly began to loot the place, though after some difficulty we restored order and effected a safe retreat. Next day Captain Stairs marched to a large deserted village about 2 miles to the south of Bunkeia and built a fort, without molestation from the inhabitants. Msiri's adopted son, Makanda Vanta, was recognised as his heir, and received as his portion the Bunkeia Valley, while his uncles Lukuku and Chikako were assigned small subchieftainships comprising their respective villages and the appurtenant fields. Then the Wasanga came in, and with them, Captain Stairs being very ill, I made fifteen treaties, and the Belgian authority was acknowledged within a radius of 50 miles from Bunkeia. From one of these chiefs, Mutwila by name, I learnt that a rich vein of gold was to be seen close to his village, about four days march to the south of Bunkeia.

On Christmas Day our porters were given a holiday, and after scouring the country-side, returned with the news that not a mouthful of food was to be obtained within a day's march. Accordingly the camp had to exist for the next three weeks upon leaves and grass, varied by fried locusts and ants. It should be remembered also that the rainy season was fairly upon us and that the rain descended in torrents for five or six hours a day. Hence, fever combined with hunger began to play havoc, and the men died at the rate of two per diem. In all we buried seventy-three, and with desertion the caravan was reduced from three hundred and sixty to two hundred. As for the Europeans, the Marquis de Bonchamps was very ill with fever, and both Captain Stairs and Robinson lay at death's door from hæmaturia and other complications. I alone kept on my legs, and an anxious time it was.

On January 24th, 1892, some Indian corn, which the natives had planted before Msiri drove them forth in the previous November, became ripe enough to be eaten, and therewith our prospects began to improve; also Captain Bia's caravan reached Bunkeia on the 30th.

After consulting with Captain Bia, Captain Stairs decided to hand

over the fort to the Belgians and to return to the coast through English territory. Accordingly we turned our backs upon the familiar *boma* on February 4th, and Lieutenant Franqui took over the station.

We pursued our old route as far as Kifambula's, but under very different circumstances. The rains had entirely altered the face of the country, and what had before been pleasant meadow-land was now a pestiferous and icy cold swamp, through which the porters had to wade while the burning sun beat upon their heads. In consequence the men, who had barely recovered from starvation, fell sick by the score, and some actually died from exposure. After straggling along the road in very disorderly fashion—for all the white men were down with fever—we left our former road on March 5th and made for Lake Moero across the Konde Rungo plateau. We hit the lake on the 15th near a large village owned by Chipula, Mpweto's brother, and crossed the Lualaba a short distance above its egress from Moero. The river, I may mention, runs due west for about 200 yards, then takes a sharp curve to the south-west, and must effect further bends before reaching Ngwena's, where it flows due north. Mr. Alfred Sharpe has described this part of Africa so recently and so well that I feel exempt from commenting upon its aspects, though we were unable to discover that the sheet of water which he terms the old Lake Moero was anything more than a swamp.

The journey from Tanganyika along the Stevenson Road to Nyasa and down the latter lake to the Shiré, and so, with the passage overland necessitated by the Murchison rapids, into the Zambesi, is familiar. On June 3rd we arrived at the Portuguese port of Vicenti, whose importance has departed with the silting up of the Qua-Qua mouth. There poor Captain Stairs was seized with an attack of hæmaturia in its gravest form, and, though we reached Chinde on the seaboard on June 4th, he expired there on the 9th. Throughout the march to the coast he had gradually been regaining strength, and by the time we reached Nyasa he was practically convalescent. Indeed he proposed, on reaching Zanzibar, to go at once to the assistance of Captain Jacques at Albertville or of Captain Lugard in Uganda. But the fever-belt did its work upon his enfeebled frame, and we buried him on the very day that the S.S. *Rovuma* arrived to take us home. It was a sad end to an expedition which he had conducted with such a signal combination of courage and caution.

Before the reading of the paper, General STRACHEY, who occupied the chair, said: The paper that will be read to you this evening describes the results of the expedition carried through the country at the head of the most southern affluents of the Congo, known as the Lualaba and Luapula, which lie between 7° and 11° N. lat., about 200 or 300 miles to the west of the southern extremity of Tanganyika. This country forms the south-east angle of the territories of the Congo Free State. The expedition was carried out in connection with the operations of the administration of that State. The country had already been

visited by several other travellers, and there is an account of a journey by Mr. Sharpe, who approached it from the east, to be found in the *Proceedings* of the Society for January 1892. I might also remind you that Mr. Arnott has been established in this region for some years as a missionary. He entered the country for the first time in 1886, and in 1889 returned to England and received the Murchison and Cuthbert-Peek awards from the Society; you may also remember that he was entrusted with the Livingstone memorial-tablet which has recently been fixed on the tree under which that great traveller died. I will now leave you to listen to Dr. Moloney's interesting account of his journey.

After the reading of the Paper, the following discussion took place:—

Commander Lovett Cameron: As a representative in England of the Katanga Company, which sent out the expedition commanded by Captain Stairs, and which has been so worthily represented here by Dr. Moloney to-night, while adding my testimony to what was done by Captain Stairs, I may say that lately, when at Lisbon, I had the pleasure of welcoming the expeditions of MM. Delcommune and Franqui, and was informed that, from the very commencement, after the first illness of Captain Stairs, the backbone of the expedition had been Dr. Moloney. While all the other whites had to be carried along in hammocks he brought up the rear of the caravan. He it was who went under fire to bring away Captain Bodson, and tended him until he died. Dr. Moloney made all the treaties, and when Captain Bia arrived turned over the fort to him; and it was Dr. Moloney who took the dying men away to Tanganyika. I had the pleasure of meeting Dr. Moloney at Marseilles on his arrival, and am sure no one can bear greater testimony as to what he did than the members of the Belgian expeditions who followed him and to some extent preceded him in Africa. I wish also to be allowed to say a few words as to the geography. With regard to the much-vexed question of the Lukuga, the expedition simply confirms every word I said from the beginning, *i.e.*, since I discovered it was the outlet of the Tanganyika. The fiction of the Tanganyika being gradually filled up has been exploded; as I wrote, the tingy-tingy blocked the exit of the Tanganyika by the Lukuga, allowing very little water to pass through, and in consequence the level of the lake varied very much—the lake may be partially blocked for a time, but there is always the exit. In another thing I am inclined to differ geographically with Dr. Moloney; he places Tabora in the Congo basin; I am inclined to place it, from my own observations, in the Nile basin; the parting lies a few miles to the south-west of Tabora when you come to the towns of Ugunda. The West Lualaba has been pointed to instead of that from Lake Moero. This might have given you an idea that the Western Lualaba was constantly interrupted by rapids, whereas from Delcommune's expedition we know that from Nyangwe the river is practically open to unimpeded navigation as far as Kassali. Again, I object to the position of the south end of Tanganyika. The south end was at first visited by Livingstone, and he believed, owing to a mistake Speke had made in his levels, due to imperfect instruments, that it was a separate lake. When I completed my survey of the south end of the lake my longitude was precisely the same as Livingstone's; and when I returned, in 1876, my observations were submitted to Greenwich, and no one said anything against them. In all other parts of my work my observations have been proved to be right by subsequent travellers; but for some reason or another the south end of the lake has been moved considerably to the west of its true position. The map shows the distance as 250 miles; now Dr. Moloney, though he travelled fast and hurriedly for a part of the way, could not have marched that distance in the time he

took, however hurriedly he may have pressed ahead; the average time occupied between the two lakes by caravans is thirteen days, and as 10 geographical miles is an exceedingly good daily average for a caravan, this would give the distance as 130 geographical miles, or nearly precisely the distance laid down in my maps nearly twenty years ago. The Belgians also assure me that my position is correct. I trust that in future maps of the Society the south end of Lake Tanganyika will be put in its proper position.

Mr. Delmar Morgan: As an old officer of the Belgian International Association, afterwards the Free State of the Congo, I should like to say a few words. In 1883, when I went out to Africa, they had only gone about 400 miles from the coast. Now they have ascended nearly to the sources of the Congo. Of the officers mentioned by Dr. Moloney in the service of the Congo Free State, M. Delcommune had just arrived and been placed at the head of the commercial expedition which he afterwards led with such distinction. There was also M. Van den Kerckhoven, of whose death we learned not long ago, while in command of an expedition to the White Nile, and I am at a loss to understand why such ungenerous reports were spread concerning him. I travelled with him from Stanley Pool to Vivi, and found him in every way a most pleasant companion and a good officer, thoroughly zealous and anxious to do his best for the work of regenerating Africa. I cannot help adding my testimony to that of Dr. Moloney when he spoke of the gallant conduct of some of the Belgian officers employed in that part of Africa. The way they have laid down their lives in the service of the Congo State and the efforts they have made to promote civilisation are worthy of every praise. While the King of the Belgians has, as we all know, been making great efforts to extend the benefits of freedom and commerce to Africa, it strikes me as remarkable that in the regions of Eastern Africa, under the influence of two great European powers, these slave caravans carrying rifles and gunpowder should still be tolerated. It seems to me that if Germany and England were at once to take adequate measures the Arab slave-trade would be a thing of the past, instead of causing, as it does now, the depopulation of these beautiful districts.

Lieutenant B. L. Sclater, R.E.: The late Captain Stairs was a much-valued friend and comrade of mine, and I have listened to Dr. Moloney's account of his last expedition with great interest. In June 1891 I had the pleasure of travelling along with Stairs and his expedition as far as Zanzibar. Again I met him at Blantyre on his return from Katanga in 1892. In spite of his weak state of health, and against the advice of Dr. Moloney, Stairs, who had suffered from a severe attack of fever at Katanga, was so anxious to get home and report on the work with which he had been entrusted, that he refused to delay a little at Blantyre in order to recover his strength, and pushed on at once down the Zambesi valley. Here he was seized by the relapse, which ended so fatally at Chinde, and thus was lost to Africa one, who, had he lived, would undoubtedly have proved himself eminently worthy to be classed among the greatest explorers of that continent. On the voyage out to Zanzibar Stairs expressed his regret to me that he was unable to use the Zambesi route on his way to Tanganyika, because Mr. Johnston had engaged all the available transport on the Zambesi for his passage to Nyasaland. Dr. Moloney's account of Stairs' expedition shows still more clearly the great advantages of the Zambesi-Nyasa route for reaching the heart of Central Africa. Whereas Stairs with a fresh and well-equipped caravan took twelve weeks to reach Lake Tanganyika by the overland route from Zanzibar, his return journey from that lake to the coast took him less than six. Again, Mr. Alfred Sharpe, Vice-Consul at Blantyre, has recently travelled from Abercorn, at the south end of Lake Tanganyika to Blantyre in twenty-eight days, of which the land journey only occupied fourteen

days, while from Blantyre to the coast I have lately made the journey in six days, and even the passage up-stream can generally be performed in from ten to twelve days. Another great advantage of this route is that in Blantyre there is a civilised and well-supplied depot 200 miles in the interior. Mr. Sharpe, when fitting out his last expedition to Moero, was able to collect from the various stores in Blantyre all the outfit, provisions and trade goods required for the six months' journey, of which he has given an account in *The Geographical Journal* for June 1893. Since Mr. Johnston assumed the administration of Nyasaland in 1891 the freedom of the Zambesi River has, through his exertions, become an accomplished fact. Goods can now be shipped from Chinde direct to British territory without any of the restrictions and duties which were formerly imposed on the Quilimane route, and which were at first attempted to be enforced at the Chinde mouth. A well-graded cart-road from Chikwawa, on the Lower Shire, to Mpimbi, on the Upper Shire, is now almost completed, and the old road made by the African Lakes Company has been improved and altered in places where it was too steep for wheeled traffic. On Lake Nyasa there are three steamers already running, and the two gunboats for the lake and a paddle-steamer for the Upper Shire are now being put together by Captain Robertson, R.N. at Mpimbi. A letter received last week from Mr. Sharpe informs me that all the parts of these gunboats are already at Mpimbi, and that the boats will probably be launched in July next, or at the latest by the beginning of August. Major Wissmann's gunboat is also in process of construction at Mpimbi, and will probably be launched before the end of this year. Mr. Crawshay has lately been sent to Karonga at the north end of the lake, to organise the surrounding district, and when the new gunboats are on the lake, there will be no need to fear the Arab power, which at one time threatened this station. The Stevenson road from Karonga to Abercorn on Lake Tanganyika is only 220 miles in length, and caravans have been passing constantly along it for the last four years without interruption. There is always an ample supply of native porters at Karonga for the conveyance of goods along the road. The Stairs expedition and the recent journeys of Mr. Sharpe, of M. Delcommune, and of Captain Bia, have shown how easily the upper waters of the Congo and Lakes Moero and Bangweolo may be reached from Lake Tanganyika. Starting again from the north end of Tanganyika the transit of 160 miles to Victoria Nyanza, as lately shown by Dr. Baumann (see *Geographical Journal*, March, 1893), should be accomplished in a fortnight. Thus the whole journey from the coast to Uganda by this route would not take more than from ten to twelve weeks, of which only about four weeks are on land, the rest being performed in steamers. This is obviously an enormous advantage in comparison with the long and continuous overland journey from Mombasa of from three to four months. I would also point out that whereas the former monthly overland mail from Zanzibar to Ujiji has been stopped for the last five years, the mail-service by the Nyasa route is now thoroughly organised. Mails are delivered at Abercorn every month or six weeks for all the stations on Tanganyika, including those in the Congo Free State and German territories. Stairs informed me that the only letters he received during his stay in Katanga arrived by this route, and not by the Congo. I thus think that Stairs' journey has, in addition to its other remarkable incidents, materially helped to prove the great advantages which the Zambesi-Nyasa route has to offer over the long land-journeys required to reach the Central African lakes, either from Zanzibar or from Mombasa. These advantages will be still further increased when the steam-tram, which we may look forward to, shall supersede the portage up the Shire rapids and the Stevenson road, and when Mr. Rhodes's telegraph from Fort Salisbury to Uganda, the construction of which is already commenced, shall have been completed.

Mr. STEPHENSON: After what Mr. Bertram Sclater has told you I think there is little to say as to the advantages of this route. I think a glance at the map proves that this is the way to open up East-central Africa. As a member of Mr. Johnston's administration I think I can safely say he has done a great deal to pacify the country. He has had several rows with the slavers, and we may safely say he has dealt several blows at the slave trade. It is matter for much regret that gallant Captain Maguire lost his life during an attack on Makanjila's. Soon after his arrival Captain Maguire had to go into action against a slaving chief. Some months afterwards he was shot in the breast, and the shot glanced along his ribs; it was characteristic of the man that he was the last to go to the doctor, allowing all the Sikhs and Zanzibaris to go first. Mr. Johnston will, I suppose, be home in eighteen months, and he will then be able to tell you of his work better than I can. He has already run several risks, and only a few months ago, in the course of a skirmish with the Arabs, a bullet went between him and the man he was talking to, hitting somebody behind him.

General STRACHEY: At this late hour it only remains for me to ask you to return thanks to Dr. Moloney for the extremely interesting account he has given of his journey, and likewise to the gentlemen who are associated with Mr. Johnston in the South-eastern part of Central Africa for what they have told us of the progress that has been made in the civilisation of these districts. We shall be very glad, I am sure, to hear, when Mr. Johnston comes back, the accounts that he is quite certain to be willing to give of the results of his adventurous administration.

PORTUGUESE EAST INDIA RECORDS.*

IN 1891 and 1892, Mr. Danvers made two visits to Portugal for the purpose of inspecting the Records at Lisbon and Evora relating to the early Portuguese possessions in the East Indies. In his report to the Secretary of State, he briefly describes the collections of documents which deal chiefly with Indian affairs, and gives extracts from those of most interest, where necessary supplementing them from already published material so as to form a more or less continuous narrative. Thus, while the report will be useful as a guide to those who have the opportunity of consulting the Records themselves—of which some have been published at Lisbon, and Mr. Danvers was thus able to procure copies—it also in itself throws much light on the details of Portuguese history in the East. The quotations from the letters of successive Viceroys to the Sovereign, and from the collections of treaties (both with European powers and Eastern potentates), are of special interest.

The early position of the History is dealt with briefly, since of this, pretty full accounts already exist in the histories of De Barros, Castanheda, and other Portuguese writers, some of which are accessible

* Réport to the Secretary of State on the Records relating to the East Indies, contained in the *Torre do Tombo*, and the Libraries at Lisbon and Evora. By F. C. Danvers, Superintendent of Records, India Office, London; 1892.

to English readers, *e.g.*, the 'Voyages of Vasco da Gama,' and the 'Commentaries of Albuquerque,' published by the Hakluyt Society. The period of the decadence of the Portuguese power is treated more fully, and the documents quoted enable us to trace the gradual progress of this decline, as well as the efforts made to arrest the same by futile expedients for stimulating trade. Repeated mention is made of the ruinous state of the public finances at the beginning of the seventeenth century, and to the extensive misappropriation of funds which seems to have prevailed. The intense rivalry between the several European nations is fully illustrated, and many instances are given of the high-handed proceedings to which it gave rise, especially on the part of the Dutch. Hostilities were incessant between the latter and the Portuguese, while these maintained, as a rule, better relations with the English, though still regarding them with great jealousy. The despatches which are reproduced on the subject of the cession of Bombay to the English are interesting, as showing that the Portuguese authorities on the spot fully realised the importance of the position, and the blow which its loss would deal to their power. The contract having however been already signed in Europe, the protests of the Portuguese Viceroy were unavailing.

The bad effect on colonial affairs of the union of the Spanish and Portuguese monarchies is exemplified by the fact, noticed by Mr. Danvers, that in the endeavour to keep the interests of the two States distinct trade was actually forbidden between the Portuguese Settlement at Macao and the Spanish Possessions in the Philippines. This prohibition seems to have been maintained even when the growing power of the Dutch in the Eastern seas, and their machinations against the Portuguese in Japan, threatened the entire ruin of Macao. The extent to which Portuguese trade was hampered by the Dutch may be gathered from the fact that one year, through want of ships and for greater security for the cargo, the Viceroy of Goa was driven to charter an English vessel to carry on the trade with China.

Many extracts are given relating to the long struggle between the Portuguese and the Mahrattas and other native chiefs of the territories adjoining those of the Portuguese in Western India, which resulted in the loss of most of the ports which had been maintained against the Dutch. The report also deals separately with the contests of the Portuguese in the Persian Gulf, firstly with the Persians and afterwards with the Turks and Arabs; their occupation of Ceylon and ejection by the Dutch, and their settlements in the Archipelago and in China. For these last the accounts contained in the records are more meagre, though some important documents are referred to touching the disputed sovereignty over the Moluccas, which throw light on the first voyages of the Portuguese to those islands after the capture of Malacca by Albuquerque in 1511. The despatches of that commander show the

importance of the latter town as an emporium of commerce, before it had been ruined by the incessant attacks made on the Portuguese there, both by the Dutch and by neighbouring native princes; thus confirming the acounts of Varthema and other travellers of that period. With regard to the Dutch attacks on Malacca it may be noticed that none seems to be mentioned of so early a date as that which Gabriel Towerson describes in a letter published in the Hakluyt Society's edition of Sir H. Middleton's voyage.

The details of the rapid rise of the Portuguese power in the far East, and of its no less rapid decline, are by no means widely known; and this report will undoubtedly be of service to those inclined to carry on researches in this interesting field of enquiry.

A TRIP TO HARAR AND IMÉ.

By Captain H. G. C. SWAYNE, R.E.*

Captain Swayne, who has been on a sporting expedition in Somaliland, writes from Aden:—I started from Bulhar on February 16th, and went to Jig-Jiga, where I found an Abyssinian guard of twenty men posted in their stockaded fort over the wells. I had twenty-five Somalis, all told. Next day, an Abyssinian chief called Banagusé Fi Taurari marched into the stockade from Gojai, about 20 miles to the west, accompanied by about three hundred and fifty horse and foot, to resist the supposed invader, the Somalis having exaggerated my trip into a British invasion. Nearly all the Abyssinians carried good Remingtons. Banagusé seemed inclined at first to arrest me, but on hearing I had come up in order to visit Ras Makuwan, the Harar governor, he was afraid to do so. I sent a letter to Makuwan, and after I had waited at Jig-Jiga a few days, one Gakatagli came with a very polite note from the Ras, asking me to come to Harar.

On nearing Harar I found I had to pass through two lines of soldiers, to the number of about a thousand, brought out to escort me, by order of the Ras, who is very hospitably inclined to the English. Each company presented arms as I passed along the path between the lines. I remained at Harar five days, a guest at the house of Alaka Gobau Desta; and before leaving I gave the Ras an Indian tiger-skin and an album of Indian photographs; receiving in return his photograph, a silver-mounted shield, spears, saddlery, and a good mule, also a passport ordering any soldiers whom I might encounter in Ogaden to treat me courteously. I also received much kindness from Count Salimbeni and the Europeans at Harar.

* Captain Swayne's route will be indicated upon a sketch-map illustrating Signor Bricchetti-Robecchi's 'Travels in the Somali Country,' in the October number.

Returning to Jig-Jiga, I made my way to Kuredelli, in the Jerer Valley, and began shooting from that place, getting a lioness and rhinoceros one night over the water. I went on down the Jerer Valley, getting two more rhinoceroses at Tulli, and a panther. Leaving Milmil three days to the east, I turned at right angles, and marched to Dagaha-madoba, getting another panther. Thence I went to Segag, one of Captain Baudi's camps, he having gone to Imé some three years ago. Near Segag, in a valley called Daghatto, I shot a bull elephant. I went on through the Malingur tribe, and after some difficulty opened up communication with the Rer Amaden tribe. Jama Deria, a minstrel, or bard, known all over Somaliland, was very polite, and advised me, if I wished to go to Imé, to leave my caravan with him at Dambas Werer, while he would lend me five ponies and the services of his son and two headmen, and we should all ride to Imé together.

With Jama Deria, his son, and two others, and three of my own men, on two Arab fast camels, one mule, and five ponies, I went to Imé and back within six days (150 miles), during nearly four of which I remained at Imé the guest of the Adone chief, Gabba Oboho, and hunted the "balanka," or waterbuck. On approaching Imé, I found the negro (Adone) inhabitants collected on the hills across the river, having deserted their huts, fearing our small cavalcade was the reconnoitring advance-guard of an Abyssinian force. The Imé people were all calling themselves British "subjects." In fact everybody except the Malingur Agaden did so. The Malingur living in the Tug Fafan Valley are in the great eastward path of invasion by the Abyssinians, hence they have had to give in to them. But the Rer Amaden have inflicted great loss on the Abyssinians from time to time. I saw the remains of the bivouac of an enormous Abyssinian army which had been defeated some two or three years before. The forest fringing the Webbe, for 100 yards on either side, is very fine at Imé, consisting chiefly of tall casuarinas and evergreens. The river is about 100 yards wide or so. Waterbuck were very common. There had been war between the Amaden and the Imé, Adone, and Somalis of Karaulé, so the country between Dambas Werer and Imé was quite empty. The Arussi Gallas, who live to the south-west, from Segag to Imé, are the great bugbear, as they raid the Somalis occasionally all along that line of country. Old Gabba promised to take me to the Gure Gallas, to the south-east of Imé, where there are said to be buffaloes and giraffes. They have a good road to Logh above Bardera, on the Jub or Webbe Ganana. Gabba said when I was there (in May), "Come in two months' time, when you can ford the Webbe with your camels."

Finding my leave nearly at an end, I returned as fast as possible by the way I had come, halting only once for a day at Jama Deria's own karias. At Durhi I was so unfortunate as to lose one of my best men, carried off by a man-eating lion while riding alone in the jungle. I

shot a lion near Segag, and a large number of the zebras which have, I believe, lately been classified as "Grevy's zebras." Their meat forms a favourite article of food among the Rer Amaden. My followers were unfortunate on this trip; one man had his leg broken by the fall of a camel, another quarrelled with an Abyssinian and got a spear through the hand, and a third was badly scratched by a panther which we were following at night. I lost eight camels out of the thirty, owing to the rapid marching and the bad state in which I found them before starting. The Somalis also consider that two died solely from the bite of the "balaad" fly of Ogaden, specimens of which I secured. The "dug" is another bad fly, but not so deadly as the balaad.

I returned by Milmil and the Habr Gerhaji's country. At Aden I found I had received six months' extension of leave, and I return to-morrow to Berbera and start for Imé afresh, with the object of doing a good private survey if possible in the country of the Gure Gallas beyond Imé; though of course my main reason for these journeys is to open up new shooting grounds. My followers place all the difficulties they can in my way, because they are afraid of the Galla country, but I am taking two interpreters who are Gallas themselves. I shall take forty rifles to Imé, and engage also Galla and Adone followers up there.

THE PHYSICAL GEOGRAPHY OF ANTARCTICA.

If the most certain method of stimulating research in a special subject is to set forth the total inadequacy of present knowledge, to answer questions raised in the setting of it, Dr. Karl Fricker's exhaustive if somewhat diffuse paper on "Die Entstehung und Verbreitung des Antarktischen Treibeises" should be to scientific explorers as grapes from an Antarctic Eschol. The contributions of Payer in Franz Josef Land and of Nansen in Greenland to our knowledge of the structure and motion of Arctic glaciers, as distinguished from Alpine or strictly valley glaciers, have thrown new light on the work of the few navigators who have as yet crossed the Antarctic circle, and a review of the subject from the more recent standpoint is excellent preparation for further personal inquiry.

The occurrence of drift-ice in the southern seas, although observed at an early date, is not a frequent entry in ships' log-books until near the end of the seventeenth century; the rediscovery of Le Maire Strait in 1616 having gradually led bolder navigators to forsake the, up to that time, invariable passage of the Straits of Magellan. Land had been discovered on the first attempt to reach higher southern latitudes by Amerigo Vespucci, who in 1502 found uninhabited land somewhere near the parallel of 50° S. Considerable doubt remains as to the identity of the land mentioned by Vespucci, uncertainty as to certain passages in his journal, and inherent errors in the determination of positions, leaving the choice of the east coast of Patagonia, the Falkland Islands, and South Georgia. Dr. Fricker inclines to select the last. Drake's Antarctic explorations seem distinctly apocryphal, and the next visitor to those parts was the Dutch pirate, Dirk Gerritz, who in 1599 was driven south from the Straits of Magellan by a severe gale, probably as far as 64° S.

After the discovery of Le Maire Strait several more or less doubtful discoveries appear in the records of the 'Nassau Fleet' under Jakob L'Heremite, of Hendrik Brouwev, Abel Tasman, and Antonio de la Roché; but the first explicit statement comes in 1681 from Captain Bárthelemy Sharp, who, while on his way to pillage Spanish possessions on the west coast of America, found himself on November 14th in lat. 57° 50′ S., somewhat east of the meridian of Cape Horn, and reports that "On this day we could perceive land, from which at noon we were due west." This Dr. Fricker takes to have been ice, which Sharp actually encountered three days later in 58° 30′ S., drifting before a southernly current. In February, 1684, the *Revenge*, with William Dampier, Edward Davis, Lionel Wafer, Ambrose Cowley and John Cook on board, reached lat. 60° 31′ S., somewhat westward of Cape Horn, without encountering ice; but on her return voyage in 1687 large numbers of icebergs were sighted in the Atlantic in lat. 62° 45′. Halley's second expedition, in 1700, cut the fiftieth parallel in 45° W. longitude, but no mention is made of drift-ice.

The first part of the eighteenth century shows a much larger number of vessels in the southern latitudes, chiefly French; and in particular the special expedition sent out under the command of Lozier Bouvet in 1738 to rediscover the "south-lands" of Binot Paulmier de Gonneville (1504). After much suffering from fog, Bouvet sighted three large icebergs in lat. 49° S., and obtained therefrom much encouragement by the remarkable conclusion that because they were high they came from high land, and high lands being healthy he must be on the way to countries either already well populated or eminently adopted for colonisation. Bouvet's Island, sighted on January 1st, 1739, scarcely justified his expectations. The discovery of South Georgia by the Spanish ship *Leon* in June, 1756, closes the list of the early explorers; and Cook's Antarctic voyage in 1775 begins the more familiar achievements of modern days.

The sources of polar ice are in the main three—snow or glacier ice, fresh-water ice, and sea-water ice, with the possible addition of a fourth, the coast ice or ice foot—and, inasmuch as the relative importance of these is determined both directly and indirectly through the influence on climate, by the geographical distribution of land and sea, the south polar regions present, so far at least as is known, an almost complete contrast to the north. The northern hemisphere has a polar sea, enclosed by a polar continent except for at the most four or five openings, of which only two —Davis Strait and the channel between Iceland and Norway—are of real moment in the movement or distribution of ice, while the southern hemisphere has a polar continent surrounded by a polar ocean, to which a number of islands contribute a quite negligible fraction of the total ice. The supposed Antarctic continent has been touched by explorers in three distinct regions—Enderby Land and Kemp Land in 40° to 60° E. longitude, Wilkes Land and Victoria Land 100° to 170° E. longitude, and Graham Land and Alexander I. Land, with a number of detached islands (for which Dr. Fricker proposes the name Gerritsz Archipelago) to the south of Cape Horn—and in each case it has been found to present an almost unbroken sheet of ice, varying in thickness and formation with the configuration of the land, which extends outwards from the coast and terminates in precipitous ice-cliffs, the great ice barrier.

The conditions giving rise to the formation of an ice-cap of such dimensions are chiefly, of course, those of climate, and of these our knowledge is as yet wofully meagre. Theory, as at present developed, requires a polar area of low barometric pressure—a uniform gradient downwards from all sides—and a belt of westerly winds with a central calm area; and for comment we have only a few sets of observations taken during the summer months, none of which extend over more than a few weeks in one place. But so far as they go the observations almost directly traverse the theoretical hypotheses. They indicate in the first place a zone

of low pressure in about 75° S. latitude, with higher barometer further south. Hann suggests that this trough is due to the passage of moving cyclones; but the supposition is not borne out by the wind observations, which show an overwhelming majority in favour of points between S. and N.E. Since the air temperature over the continent cannot even in summer much exceed the freezing-point on account of the ice covering, it seems not unreasonable to suppose as an alternative that pressure continues to increase with latitude after the 75th parallel, and that the southerly and easterly winds are the overflowing currents from a permanent polar anti-cyclone. It was to be expected *à priori* that a theory founded on the assumption of a homogeneous land or sea surface would require modification in the circumstances, and the vertical height of the supposed anti-cyclone need not be sufficient to interfere with upper currents, it might in fact rest as a cushion on the land surface almost independent of the general circulation.

Granting the existence of the polar anti-cyclone, it is not difficult to imagine that the moist warm air ascending from the low-pressure zone moves southwards and feeds the anti-cyclone, discharging large quantities of moisture as snow and sleet, and also in the form of crystals deposited from mist, as the temperature is reduced by the ice sheet; and since the supply of vapour is greatest during the more open season in the low-pressure belt, it seems likely that precipitation is greatest during summer. Such climatic conditions are fully sufficient to account for the presence of glacier ice in almost unlimited quantity, provided we assume the existence of continental land, an assumption strongly supported by our knowledge of the Arctic regions, the negative evidence of Grant's Land and the positive of Franz Joseph Land being specially pertinent.

Glaciers of the valley or Alpine type are found on the most stupendous scale; Ross describes one on the east coast of Victoria Land as filling a valley bordered by mountains 6000 to 10,000 feet in height, and sending a tongue far into the sea. But the distinctive feature is the inland ice, known as yet only by the insurmountable cliffs facing the sea. This barrier is remarkable for the uniformity of height it retains for long distances; from the volcanoes Erebus and Terror Ross traced it eastwards for 250 miles, and gives the narrow limits of 150 to 200 feet, Wilkes gives for other parts 150 feet, d'Urville 100 to 150 feet, and Biscoe 100 to 120 feet; in Grahamsland on the other hand only 12 to 14 feet is stated. Again, the barrier-ice is noted by the absence of detritus, or moraine material of any kind.

The stormy weather of the southern ocean, and the strength of the tidal streams are in themselves almost sufficient to prove that the barrier-ice is not field-ice formed at sea, but essentially inland ice, and of this further evidence may be derived from its structure. Wilkes, Webster, d'Urville, and in particular the *Challenger* Expedition, give information derived from the examination of icebergs, and agree in describing the ice as of a stratiform structure, their blue layers of hard ice alternating with thicker beds of white soft ice enclosing air, the latter thicker and softer near the top of the ice, and the former preponderating in the lower strata. Similar formations have been observed by Nansen and Payer, and the presumption is that the soft strata represent snow fallen during winter, and the hard a surface partially melted during the warmer months and re-frozen. Under great pressure the whole mass is gradually converted into homogeneous hard blue ice.

Concerning the several motions of the inland ice, we are without information of any kind. Of the various computations as to its mean thickness, Dr. Fricker adopts that of Thomson—1400 feet.

According to Heim, there are four possible agencies tending towards the dissolution of glacier ice—melting from above, melting from below, internal melting, and the breaking away of drift ice. From the considerations stated above it appears

that Antarctic glaciers are chiefly exposed to the second and last of these, the action of warm water eating away the under surface, and the separation of enormous ice-bergs. Under the most moderate estimates Dr. Fricker calculates that a minimum of 258,000,000,000 cubic metres of ice are annually detached from the ice-barrier and set adrift. The subsequent wanderings of these bergs are chiefly controlled by the ocean currents, although the direct influence of wind is considerable, and the normal "northern limit of drift-ice" is of special interest from the amount of information relating to currents which can—due caution being exercised—be obtained from it. Taken generally, the set of the currents corresponds in direction to the prevailing winds, from south towards north, north-west and west. To this rule there are, however, important exceptions. A comparatively strong easterly current prevails to the south of Cape Horn, probably because of the strong development of the west-wind drift to high latitudes in the South Pacific, and the contraction of Bransfield Strait. Again, the motion of the streams becomes extremely involved in the two cases where the coast trends north and south, east of Gerritsz Land and Victoria Land, in part probably simply tidal, and in part "compensation currents" flowing southwards. Neumayer to the contrary notwithstanding, Dr. Fricker admits the existence of only one true southernly current—to the south of Kerguelen—and of this he proposes an extremely ingenious explanation. Kerguelen and Head Island are connected by a range of submarine mountains some 240 miles in length, which rises to within 100 fathoms of the surface. Assuming that the westerly drift current extends below this depth, on meeting the obstacle it will divide and a part will be deflected in a south-south-easterly direction, and will to some extent retain that direction by virtue of its superiority in speed over the currents of higher latitudes. The other section of the current, deflected northward, may account for the bend of isothermal lines in that direction observed in the vicinity of Kerguelen.

The general northward tendency of the surface currents, taken along with the known presence of Antarctic water in the lower depths of the oceans of the southern hemisphere, raises a question of considerable difficulty as to the nature of the return or compensation current. Dr. Fricker offers a solution of the problem, based on the temperature observations of the *Challenger* and the *Gazelle*, which concur in showing a stratum of relatively warm water at depths between 700 and 900 fathoms in all oceans. The bottom water, moving slowly northward, is ultimately stopped and forced to ascend (the phenomena are naturally most fully developed in the Indian Ocean), its temperature greatly raised, and finally its density so increased by evaporation that it sinks to a position of equilibrium at an intermediate depth and flows southwards, tending at the same time eastwards through the Earth's rotation as a warm current. On regaining the Antarctic regions the water of this intermediate current is in part absorbed in the formation of ice, and the remainder being thereby increased in density sinks to the bottom and begins its slow return northwards.

THE GEOGRAPHY OF THE TATRA GROUP.

Among the proceedings of the Geographical Institute at Vienna, a new report by Dr. Carl Grizzinger deserves special notice. It is entitled, "Studies on the physical geography of the Tatra group," and has particularly reference to climatic conditions. It is meant to supplement the writings of Von Sydow, Warhamek, Koristka, and Le Bon, as well as the report of the physiographical commission appointed by the Academy of Sciences of Cracow. The author considers successively

the orographical, geological, and orometrical conditions, then proceeds to a description of the lakes belonging to the Tatra group, and finally he devotes the whole second half of his work to the climatic conditions of the mountain-range.

The outcome of a comparison between the Alps and the Carpathians is that in contrast with the former, the latter have no definite crystalline zone, forming, as it were, a continuous main ridge, nor is this accompanied by lateral zones of more recent growth. The true mountain-range alone appears in the Carpathians in distinct sections, the highest being the Tatra group. It is therefore quite inadmissible to call this group Central Carpathians in the same sense as one would speak of Central Alps.

The limits of the Tatra group are evidently those formed by nature, similar, in this respect, to the Rilodagh, in the Balkan peninsula; the group itself, however, can be divided into three branches going from west to east, as follows:—Liptau Alps, from the Pass of Kvačan (2214 feet), to the Lilijowe Pass (6395 feet), Higher Tatra from the Lilijowe Pass to the Kopa Pass (5815 feet), Bela Kalkalpen from the Kopa Pass to the Zdjár (3516 feet).

The first altitudes were taken in the Tatra group by the Scottish traveller Robert Townson in 1793; according to him Lemnitz peak (8639 feet) was the highest, and so it was considered up to Karistka's observations, when the Gelsdorf peak (8734 feet) was stated as being the highest summit of the Tatra group, *i.e.*, of the whole Carpathians.

The main statistics of altitudes which alone can allow us to make a true comparison of the orographical conditions are shortly as follows:—

——	Length of main ridge.	Mean altitude of ridge.	Mean altitude of chief peak.	Mean height.	Mean height of mountain border.	Mean altitude of masses.
	Miles.	Feet.	Feet.	Feet.		
Liptau Alps . . .	26½	6860	7000	5379		
Higher Tatra . . .	16	7720	8350	6812		
Bela Kalkalpen . .	4½	5560	6960	5077		
Tatra Group . . .	47	6420	5302	5828	3004	4887

The mean altitude of masses, this important orometric factor, adopted by Humboldt, gives the altitude to which the mass of the mountains would reach if one imagines all the heights and hollows of its sky-line as being levelled.

There are one hundred and twenty lakes in the Tatra group, of which one hundred and thirteen are in the higher Tatra. All the lakes are situated in the granite, none in the calcareous district; the same fact was noticed in the Pyrenees and in the Eastern Alps by Penck.

The lakes are all found at a height of 3900 feet to 7200 feet above sea-level, and fully eighty per cent. of them are between 5000 and 7200 feet. This rich belt of lakes is quite analogous to the one of the Eastern Alps, mentioned by Böhm—excepting that (taking into account the more northerly situation of the Tatra group), its lakes are situated lower down than in the Alps. As in the Alps the mean height of the range also influences the comparative elevation of the lake zone, while in the lower Liptau Alps it stretches from 5000 feet to 6000 feet. It reaches in the Higher Tatra from 5000 to 7000 feet. Again the exposure is a determining

condition, for nearly seventy per cent. of the Tatra lakes are situated on the southern slope, and are sheltered by higher lateral ridges. One also notices an increase in the elevation of the lakes, and in their number from west to east, just as is the case with the snow patches of the Tatra. This distribution of altitude in the lakes connected with the appearance of "Roches moutonnées" and other glacial forms, including mounds of moraine material, undoubtedly connect these mountain lakes with former glaciation of the Tatra group; as was remarked by Partsch in 1882. Half of the lakes occupy distinct rock-basins, *i.e.*, all those situated higher than 5000 feet. The majority of those occurring lower are moraine lakes. The mean difference of altitude between these and the rock basins is 1600 feet. As these moraine lakes represent the terminal portions of ancient glaciers from which they had gradually melted upwards to the rock basins Dr. Grizzinger considers himself justified in assuming that the variation in altitude being 1600 feet corresponds to a difference in temperature of 36°·5 F., and seems to give the total amount of increase in temperature since the glacial period.

Dr. Grizzinger's observations on the fall of temperature of the lake water in proportion to its depth are also interesting, inasmuch as it is the first survey of the kind made in the mountain lakes of Eastern Europe. All the soundings were taken in August and always during the early afternoon.

——	Lake Fisch (N.).	Lake Csober (S.).	Lake Popper (S.).	Lake Ela (S.).
Above sea level . .	4539 feet.	4431 feet.	4929 feet.	6888 feet.
Mean depth . . .	123 „	68 „	48 „	11 „
Area	80 acres.	50 acres.	36 acres.	0·25 acre.
Depth in feet:—	F.	F.	F.	F.
3½	52·2°	60·4°	53·4°	46·4°
6½	51·8°	60·3°	52·3°	45·5°
10	51·4°	59·7°	52·0°	44·4°
13	51·3°	59°	51·1°	
16½	51·1°	58·6°	50·7°	
33	46·6°	43·8°	45·1°	
66	41·9°	42·6°		
100	40·3°			

We see that the lakes having a southern exposure show in proportion to their altitude,—first a warmer water-surface, and second, a quicker fall of temperature relatively to depth. Such is Lake Fisch, which has a northerly aspect.

So far as these observations relate to the climatic conditions of the Tatra group the investigator systematically kept separate the results of observations of the meteorological stations situated north of the main range from those taken on the southern ones in order to eventually arrive at the conclusion that the Tatra group had a climatic influence. This had not been authenticated before, but it can be actually and accurately proved both by the temperature and by the distribution of wind, and in a less degree by the cloud system; while the rainfall cannot be taken into account at all.

The whole southern district shows on an average of fifteen years a temperature of 1·8° Fahr. over the northern parts. The well-known Spa, Neu-Schmecks (3296 feet), is 2·5° Fahr. warmer than Javorina situated on the northern slope of the range at an elevation of 3250 feet. Javorina is the highest meteorological station in the Carpathians (a summit station not yet existing in the whole mountain district).

With reference to seasons, it is interesting to note that on the north side

autumn is warmer than spring, while the reverse is the case on the southern side. Comparing the decrease in temperature in relation to the altitude, which in this part is 1° Fahr. for every 328 feet (just as in the Alps), Dr. Grizzinger estimates the level of the isotherm of 32° Fahr. for the year, on the northern side at 5726 feet, and on the southern side at 6212 feet. The height of this important line thus almost entirely coincides with the orographic snow limit established by the same investigator after previously made observations which have already been published.

The highest summits of the Tatra thus overtop the snow limit by 1968 to 2295 feet. The very steep incline prevents any *connected* snow covering from being formed, but there are about forty snow-patches, of which two-thirds are on the southern slope.

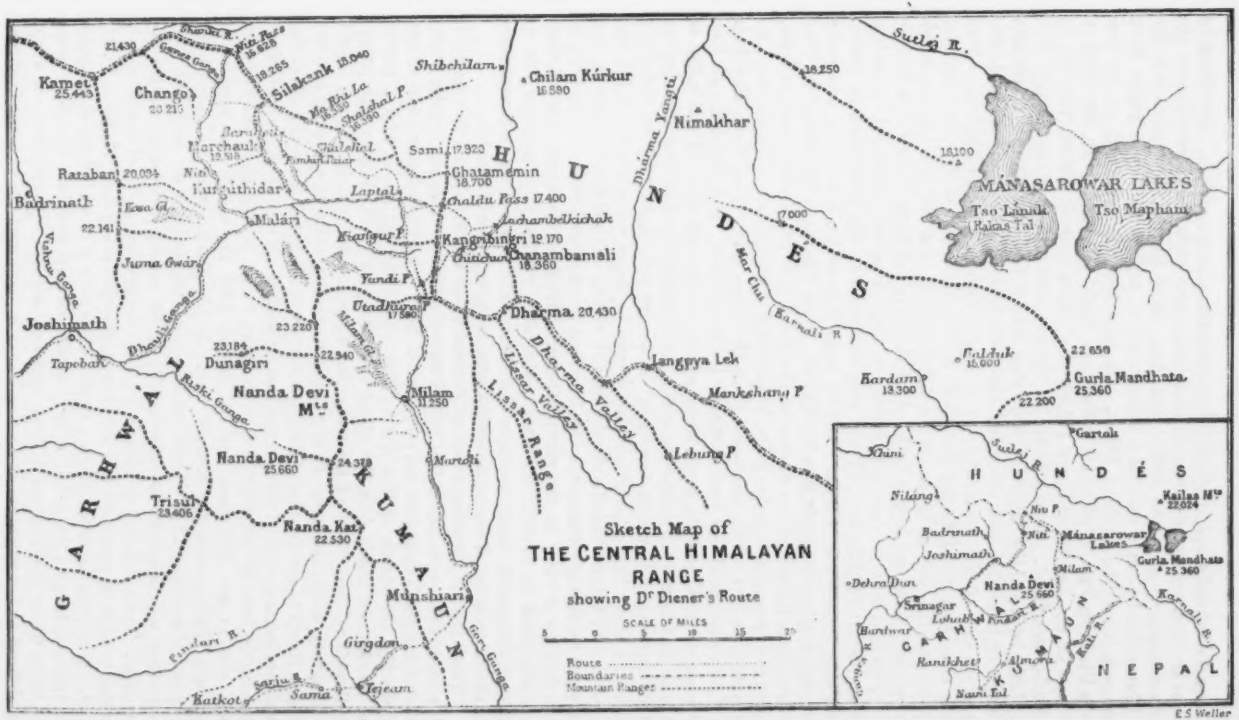
With reference to the distribution of winds we find, as Supan had already remarked, westerly winds on the north slope, while on the southern side, which is not directly sheltered by the main range, northerly winds prevail. A further and more typical contrast between the north and south slopes is in the proportion of winds to calms, the south side giving a much more favourable record. In Neu-Schmecks, which is sheltered by the main range, the proportion of calms to winds is seven to three. The author refers also to the probable existence of a "Föhn," in the Tatra group, analogous to the well-known warm Alpine wind, which would alone explain the remarkable variations in temperature noticed in winter on the north slope and contrasting strangely with otherwise exposed stations.

The cloud system shows a maximum in the north during December and in the south during November, the average being greater on the northern than on the southern slope.

DR. DIENER'S EXPEDITION TO THE CENTRAL HIMALAYA.*

This expedition to the Central Himalaya, Kumaon, Garhwal and Hundés was undertaken in 1892 at the instance of the Vienna Academy of Sciences and of the Indian Government, with the object of studying more closely the trias deposits on the Tibetan frontier. Besides Dr. Diener, Messrs. L. Griesbach and C. S. Middlemiss, representing the Geological Survey of India, took part in the expedition. The starting-point of the expedition was the sanitarium of Naini Tal, whence they proceeded with seven servants and eighty-five coolies through Munshiari to Milam. The coolies were changed from station to station and carried a load of forty pounds weight for the sum of four annas. Milam is situated at an altitude of 11,250 feet, and is the highest inhabited (only from May to October) village in the Bhot Mahals, *i.e.* in the Tibetan border region. It lies above the tree limit, although buck-wheat and potatoes are cultivated in the vicinity. The border trade with Tibet forms the chief means of subsistence of the inhabitants, among whom are many wealthy persons whose property comprises often several thousand sheep and goats. The whole of the Tibetan trade is carried on with the aid of these animals, and what the camel is in the desert, the sheep is in the Himalayan regions. Rice and meal are carried by these animals in a kind of saddle pouch on both sides of the back. The Milam glacier, which terminates at a height of 11,340 feet at a distance of 2 miles north-west of Milam, is the largest of the ice-streams of the Nanda Devi group, and is 12 miles in length. Owing to the very slight fall, it has no

* Report of a paper read before the Geographical Society of Berlin, June 3rd, 1893.


Sketch Map of
THE CENTRAL HIMALAYAN RANGE
showing Dr Diener's Route
SCALE OF MILES
0 5 10 15 20
Route
Boundaries
Mountain Ranges
HUNDES
MÁNASAROWAR LAKES
Tso Lanak
Rakas Tal
Tso Maphám
Kamet 25.445
Changa 23.213
Silakank 19.040
Shibchilam
Chilam Kúrkur 16.580
Nimakhar
Sutlej R.
Badrinath
Joshimath
Dunagiri 23.184
Nanda Devi M.te
Milam 11.250
Nanda Devi 25.660
Trisul 23.406
Nanda Kot 22.530
Munshiari
Girgdon
Katkot
Sama
Tejam
Dharma 20.430
Langpya Lek
Lebung P.
Kardam 13.300
Guria Mandhata 25.360
Dharma Valley
Lissar Range
Milam Gl.
Ralam Gl.
Ralam Valley
Darma Valley
GARHWAL
KUMAON
NEPAL
Dehra Dun
Srinagar
Almora
Ranikhet
Naini Tal
Kailas M.te 22.024
Gartok
Gyani
Nilang
Badrinath
Joshimath
Milam
Nanda Devi 25.660
Guria Mandhata 25.360
Kamali R.

E.S. Weller

remarkable breaks, and is completely covered with moraine rubbish. Its tributaries also are long, narrow ice-streams lying between steep walls, thus accounting for the great development of the surface moraines. After lengthy negotiations with the Tibetan frontier-guard permission was obtained to explore the border region lying immediately to the north of Milam. On June 19th the expedition set out over the Utadhura Pass (17,590 feet) to the upper Girthi valley, where on the southern slopes of the Bambanag Range (19,000 feet) some trias formations, very rich in fossils, were found. From here the journey was continued over the Kiangur Pass (17,000 feet), and the Kisgarh-Chaldu Pass (17,400 feet) to that part of Hundés, bordering it on the east, which had not hitherto been geologically explored, viz., the district of the pasture-grounds of Lachambelkichak and Chitichun. Here the expedition stayed during the whole of the latter half of July, and ascended four times the peak of Chitichun No. 1 (17,740 feet) and the two Chanambaniali summits (18,320 and 18,360 feet). After the party had been detained at a bivouac (17,000 feet) for three days by a snowstorm, they succeeded in scaling the summit of Kangribingri (19,170 feet), whence they returned over the Yandi Pass to Milam, arriving there on July 30th. During these five weeks, their camp was never pitched at a lower altitude than 14,500 feet. From the top of Chanambaniali they were able to distinguish the contour of the basin, in which the Manasarowar lakes, with their area of 310 square miles, lie imbedded at an altitude of 15,300 feet. In the southern part of the mountain circle the three summits of Gurla Mandhata (25,360 feet) stood out very strikingly ; this mountain, with its mighty glaciers, completely dominates the surrounding region. It was not the cold and rarity of the air that formed the most serious obstacles to scientific work at these altitudes, but the storms which blew from the south, day by day with equal violence, and which were so heavy that photographs could only be taken when the apparatus was protected by the erection of a circular wall of stones. The difference between the day and night temperatures was very large, and found expression in the difference in the volume of water in the glacier streams. While at daybreak most of these streams could be conveniently waded, soon after sunrise they were swollen to mighty rivers often within a quarter of an hour. The region of the pasture-grounds of Chitichun is one of the most desolate parts of the province of Hundés.

The bottom of the valleys does not descend below 16,000 feet, and the vegetation is so scanty that even the juniper bushes are seldom seen. Frequently dried pieces of turf and yak's dung form the only kind of fuel. The whole country bears most distinctly the stamp of the desert; the mountains are girded with a mantle of *débris* from which only the actual summits project. It is only the intense yellowish red and violet of the rocks that moderates to some extent the doleful uniformity of the country. It was found to be impossible to penetrate into the Lissar Range in consequence of the impassability of this region for beasts of burden, and also because of the lack of provisions for coolies. It was therefore determined to advance into the territory of Rimkin Paiar, which is claimed by the Tibetans, and also to the Niti Pass, and on August 18th the march was commenced through Utadhara and the Kiangur Pass. In the pasture-ground of Laptal the expedition encountered a Tibetan frontier-guard composed of six men, but their opposition was overcome by presents and by the resolute demeanour of the expedition. The march was then continued along the southern slopes of the watershed, which consists of bare slate and sandstone mountains rising from 17,000 to 18,000 feet. Numerous herds of Tibetan steppe-horses were met with here, also kyangs and mountain sheep, the stately *Ovis Hodgsoni* and *Ovis Burrhal*. Frequent traces of bears, white leopards, and Tibetan wolves (*Canis laniger*) were seen. It would be difficult to find anywhere in the world, even in the Grand Cañon of the Colorado,

more magnificent geological sections than those which are presented by the limestone zone of the Central Himalaya in the vicinity of Rimkin Paiar and on the Silakank, where in places one can see at a glance the whole series of the marine deposits from the Lower Silurian up to the chalk.

In contrast with the uniform character of the country between Laptal and Barahoti, the green Alpine meadows of Rimkin are refreshing to the eyes. Along the watercourse in sheltered places may be seen dense thickets of salix and birches. Isolated specimens of birches, 16 to 23 feet high, with wonderfully crooked trunks, grow up to a height of 14,000 feet, otherwise in the Central Himalaya the tree-limit lies between 11,000 and 12,000 feet.

At the time when the expedition was in the country the Tibetan shepherds were busy collecting dry branches, which are in request at the festival games which take place at Gartok on the Upper Indus, a proof of the value of this material in Hundés, which is so poor in fuel and timber. The weather was uncommonly bad here; no less than twenty-six rainy days were counted in August.

In the valley of Dhauli Ganga, into which the expedition descended after having advanced to the Niti Pass (16,628 feet), the most frequented pass of the Central Himalaya watershed, and the vicinity of which is covered up to a height of 17,300 feet with glacier rubbish of the upper carboniferous quartzite, were found from a height of 9000 feet upwards numerous traces of an ice-age in the formation of mighty remains of old moraines. The village of Niti lies somewhat higher than that at Milam, 11,464 feet.

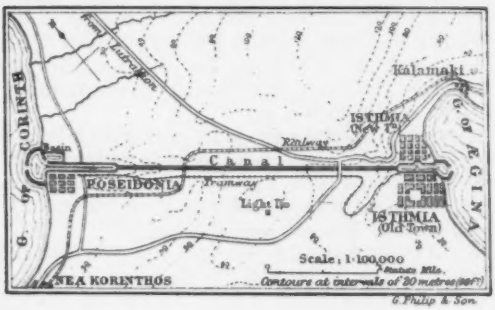
In the Dhauli Ganga valley forest vegetation extends up to 11,000 feet; the forests are composed principally of the magnificent deodar cedar, which at Juma Gwar forms beautiful forests. From Joshimath the expedition followed the usual route of the Badrinath pilgrims through Lohab and arrived once more at Naini Tal on October 7th, 1892.

THE MONTHLY RECORD.

EUROPE.

The Corinth Canal.—The opening of the Corinth Canal on August 6th adds one more to our international highroads of commerce, and although this, the most recent of ship canals, is not at all likely to effect a revolution in the world's trade, such as has been brought about by the opening of the Suez Canal, it is all the same of considerable local importance. Vessels bound from the Adriatic to the Piræus, Smyrna, and Constantinople, and making use of this canal, will not only effect a saving in distance of about 120 miles, but they will also avoid the dreaded Cape Matapan, the doubling of which is attended with danger during the winter months. Anciently the Isthmus of Corinth was crossed by a road for the conveyance of merchandise and small boats. Periandros of Corinth, who lived about six hundred years before Christ, is credited with the intention of substituting a canal for this road; but nothing was done until the advent of the Romans. Julius Cæsar, who rebuilt Corinth in 46 B.C., seriously entertained the project, and Nero actually employed thousands of Jewish captives and convicts upon the work, but his attention was drawn elsewhere when J. J. Vindex, the Roman governor of Gallia Lugdunensis, revolted in A.D. 68, and proclaimed Galba emperor. It was thus reserved for General Türr to realise the project of the ancient Greeks and Romans. In 1881 he secured a concession from the Greek Government for building the canal. Work

was actually begun in May 1882 by a French company, and on its failure it has been completed by a Greek one, with M. Matsas as engineer. Very considerable engineering difficulties had to be overcome, as the isthmus rises to a height of 200 feet. The Canal is 26 feet deep, 72 feet wide, and 6890 yards in length. It



begins about 1¼ mile to the north of New Corinth, quite a modern town, built since 1858, in which year an earthquake destroyed the ancient city, and terminates near the spot where the Isthmian games used to be celebrated. Two new towns, of ambitious dimensions, have been laid out at its termini, one being called Poseidonia, the other Isthmia.

Submergence of Western Europe.—Dr. Joseph Prestwich recently contributed a paper to the Royal Society on "The evidences of a submergence of Western Europe and of the Mediterranean Coasts at the close of the Glacial and immediately preceding the Neolithic period." The evidence mainly consists of beds of "rubble drift" and osseous breccia which are found over Western Europe and the shores of the Mediterranean, the loess over parts of Central Europe, and animal remains in fissures on isolated hills. From these facts the author infers an extended but comparatively shallow submergence of short duration, which did not allow time for marine sedimentation. The principal geographical evidence is found on the northern and southern coasts of France, at Gibraltar, in Sicily, Malta, and Greece. On the Palestinian coast there are but few traces of the peculiar drift, and the submergence there must have been small, if any. On the North African coast evidence of submergence is found at Tetuan and Oran; but towards the east the depth must have been slight, and perhaps in this direction the submergence did not extend beyond the Libyan desert. The author concludes also that in estimating the time that has elapsed since the Post-Glacial Period a measure of ten thousand to twelve thousand years is a closer approximation than ninety thousand.

Scandinavia and the Level of the Sea.—A German correspondent sends us the following supplementary statement regarding Dr. Sieger's work on the upheaval of Scandinavia, briefly referred to in the August number, p. 174:—"The first point discussed by Dr. Sieger is the shift of relative level on the Swedish coasts. Formerly this was attributed to a local or to a general fall of the water surface, and it was asserted that the same phenomenon was noticeable in the lakes and rivers of the country. Since the time of Playfair and Buch, however, the existence of an *upheaval* of the land has been admitted; while R. Chambers, Trautschold, and especially Suess, returned to the older opinion. According to Suess the Baltic is higher than the ocean, on account of the volume of fresh water

poured into it by rivers; but as these decrease in volume the sea-level sinks slowly, until it will eventually reach that of the ocean. Such a fall must be preceded by similar shrinkage of the inland lakes. Sieger tries to prove this by means of observations dating back to 1774, taken on eight Swedish and seven Norwegian lakes. The annual range is principally determined by the diminished precipitation in winter, and the epoch of snow-melting in various parts of the country, which reaches its maximum in spring and in early summer. The Baltic, which reaches its lowest level at the same period, continues to rise until the precipitation attains its maximum in late summer and autumn. A second rise in the sea takes place in December, and is not noticeable in the lakes, except in the few which are almost at the sea-level. This is not a regular occurrence, but due to special causes of a rather complicated nature, the direction of the wind being an important factor. Since observations have been started, no change in the yearly curve of the sea-level is traceable. On comparing the levels of different years with each other, deviations are observed which correspond exactly to the thirty-five years' range of climatic variations arrived at by Brückner. On the Swedish coast, as well as on that of Finland, and in the Kattegat, we can distinctly trace a decrease in the level; on the other hand, such a change is absolutely unknown in the lakes excepting in Mälar, near Stockholm, the investigation of which would necessitate exhaustive and special investigations, as its conditions are quite peculiar. In determining the amount of decrease for various places we must consider variations of climate. We can, therefore, only compare simultaneous observations, and often we may be in doubt whether apparent exceptional conditions are not perhaps the result of varying periods of observation. However, it seems to be clear that there exists a zone of greater change of level near Gefle and Wasa, the upheaval lessening again towards north and south. The writer rather inclines towards a theory of upheaval of the continent than towards that of a local fall of sea-level, such as Suess considers probable. How much of this is due to general movements of the sea can only be determined when we possess observations extending over many years in Norway."

AFRICA.

Dr. Gregory's Expedition to Mount Kenia.—Dr. J. W. Gregory arrived at Mombasa on August 19th, after a successful expedition to Lake Baringo. He returned *viâ* Likipia and Mount Kenia, and ascended the latter to a height of more than 17,000 feet. Dr. Gregory has explored the glaciers and head-waters of the Tana, and the water-partings between the Tana and Athi Rivers.

Mr. Selous.—Mr. F. C. Selous sailed on August 26th for South Africa, *en route* for Mashonaland. His sudden departure is due to the threatened troubles with Lobengula. He hopes to arrive at Victoria in about a month, and if things are quiet he will return at once.

Ruins in Mashonaland.—Mr. R. M. W. Swan writes as follows from near Maklutsi: "I have examined two ruined temples of the Zimbabwe period and style, situated at the confluence of the Lotsani and Limpopo Rivers in S. lat. 22° 39′ 42″, E. long. 28° 16′ 30″. The temples show the same system of orientation and geometrical construction as the great temple at Zimbabwe. I cleared the bush from the more perfect of the two temples on the Lotsani and made a careful measurement of many of the radii of the one curve of which it consists. I oriented directly from the centre of the curve and saw the sun from that point setting just

to the left of the middle of the main doorway. On correcting the position of the sun for its decrease in declination during the seventeen days which had elapsed since the solstice, I found that it would set at the solstice exactly in a line with the centre of the arc and the middle of the doorway. This direct measurement and observation should remove any doubt as to the applicability of our theory of the construction of the plans of these temples." Mr. Swan adds that he has travelled 350 miles along the Limpopo River and has made some important rectifications of positions, details of which will be forwarded to the Society at an early date.

Uganda.—The British occupation of Uganda necessitating the presence in Africa of experienced officers, who understand Arabic and can handle the Sudanese troops, Colonel Colvile of the Grenadier Guards, Captain Gibb, Captain Besant and Captain Thurston, have been sent to act under Sir Gerald Portal, the administrator of the country. Colonel Colvile's experience in Africa is already considerable. He served under Lord Wolseley in the Sudan, and subsequently made an extensive journey through Africa and Madagascar, which is well described in his wife's newly-published book, 'Round the Black Man's Garden,' noticed in these pages last month.

New Expedition in French Congo Territory.—The *Politique Coloniale* announces the departure from Marseilles, on August 10th, of an exploring party, despatched by the Société d'études du Congo Français, to study the valley of the Kwilu-Niadi (Noari-Quiliou) with the view of testing its suitability for a railway from the coast at Loanga to Brazzaville on Stanley Pool. The expedition is divided into three departments under the general leadership of M. A. Le Châtelier. The survey party is commanded by Captain Cornille, who was recently connected with the projects for a French Sudan railway. Botanical studies are under the charge of Dr. Lecomte and Captain Lamy, and the geology of the country traversed will be studied by M. Regnault.

Kling's Last Journey in Togo Land.*—Captain Kling, it will be remembered, died from dysentery on September 15th last, soon after his return to Germany. On his last journey he proceeded from the coast through Salaga to Bismarckburg, whence he set out with his expedition on October 21st, 1891, for the north-east. Following first of all the general line of Dr. Wolf's route, he paid a visit to the Sultan Jabo Bukari of Shancho, and delivered to him the imperial presents; then at Wangara, the capital of Sugu, he left Wolf's route on November 24th, in order to penetrate directly north into Western Borgu. Borgu is governed by three brothers, of whom the one living in Nikki is the most powerful. Western Borgu is ruled over by the Sultan of Kwembe, and the southern part is under the sway of the Sultan of Birni. At Birni Kling met with a very friendly reception, but when he had arrived within about 7½ miles of the capital (Kwembe) messengers from the Sultan of that place told him that the king would not have any white men in the country, because the first white man (Dr. Wolf) who had come to Borgu had brought so much misfortune on the land. It was after Wolf's death (1889) that a civil war, occasioning much bloodshed, broke out over the question whether the white men should be allowed into the country. Kling, therefore, retraced his steps to Birni, where the Sultan of the place protected him against the exactions of the people. From Birni he returned

* Report of a paper read by Dr. von Danckelman before the Geographical Society of Berlin, June 3rd, 1893.

to Alejo along the same route as that by which he had come, and marched from there along the great Hausa caravan route, which had never before been trodden by a white man, passing through the uncommonly well-populated regions of Bafilo, Basari, San Sugu to Salaga, where he arrived on January 19th, 1892. From this point he determined, with the object of studying the slave-trade, to proceed to Kintampo, which he reached on January 30th, having followed Binger's route. On the way he fell in with numerous Hausa caravans, each with a large number of slaves, who although fettered with iron-collars, were dragging very heavy loads of kola nuts. In Kintampo the slave-trade flourishes to an even greater extent than in Salaga. Kling made his way back from Kintampo to Salaga by a wide detour to the north, *viâ* Bupe. The whole region between the two places is a level savanna. The pyramids of skulls of buffaloes, antelopes, elephants and hippopotami, which are erected at numerous points, give evidence of an enormous wealth of game. As Kling on this circular journey crossed only two arms of the Volta, it is probable that the Red Volta unites with the White Volta, and not, as hitherto shown on the maps, with the most southerly or Black Volta. From Salaga Kling returned through Kratye to Bismarckburg, where he arrived on March 11th, 1892, already suffering from dysentery. From the traveller's route-surveys and numerous astronomical observations it has been possible to construct a map of his journeys, which forms an important extension of our knowledge of the geography of the countries between the Volta and the Niger. His expedition has had the further result of showing that the regions between the Borgu and Salaga States, as well as the countries of Shancho and Dagombo, are much superior in fertility and density of population to the districts lying nearer to the coast. Thus for example Bafilo, a place of about fifteen thousand huts, far surpasses Salaga both in size and importance. Agriculture and cattle-rearing are in a most flourishing condition in these countries: the traveller passes through miles of yam and millet-fields, which are cultivated by large bands of quiet, unassuming slaves, who march out from the villages to their work at the sound of the drum and fife.

AMERICA.

Geological History of Lake Superior.—Professor A. C. Lawson contributes to the Annual Report of the Geological and Natural History Survey of Minnesota a valuable paper on "The abandoned strands of Lake Superior." The investigation, which was begun in 1891, chiefly concerns the evidence for abandoned coast-lines on the northern shore of the lake. These strands represent stages in the extent of a sheet of water which was very different in its general physiography from the present Lake Superior. It must have been many times more extensive, covering the entire region of the lakes Huron and Michigan with several hundred feet of water. Its whole extent was probably twice as great as the combined areas of Superior, Huron, and Michigan, and the Algonquin beach on the coast of Huron marks only an episode in the later stages of shrinking. The name Lake Warren is given to this great sheet of water from its highest state down to that stage where its waters became definitely segregated into the different subordinate depressions. The number of observable strand lines on the coast of Lake Superior varies from one to nineteen; in portions of the coast none can be detected. This discrepancy is partly due to obscuration of the topography by timber, while the differences between observed beaches and terraces almost contiguous to one another may be due either to the fact that the coastal slope is not equally susceptible at every point of registering the shore-lines, or to the fact that terraces have been obliterated by wave action at

lower levels. Or possibly the differences may be due to differential movements within the limits of the present lake basin; a portion of the coast may have changed its altitude relatively to the outlet, or the entire coast may have changed its inclination. In the former case there would not, even with a complete record, be the same number of strand lines in every part of the coast; in the latter there would be an equal number of lines, but all would converge upon the outlet. The tables of elevations supplied prove that there is a prevailing constancy of vertical interval between the strand lines, and this fact points to an uniform subsidence of the water along the entire extent of the coast. In the table there are recorded thirty-three strands having distinct altitudes; in the history of the recession of the lake there have thus been at least thirty-two stages. The maximum number of strands observed in one place is nineteen. Each of the many stages of Lake Warren must have had its level determined by a definite outlet, and the means of the lowering of the outlet was probably crustal deformation. The place in which evidence of such changes should be looked for lies to the south and south-east of Lakes Michigan and Huron. The general result of the movements which lowered the southern barrier of Lake Warren seems to have been an elevation of a large part of Central Canada, and a relative or absolute depression of the States Ohio and Indiana. It is possible that before this elevation of Canada the drainage of the lake was towards Hudson's Bay. The portage south of the divide between the Hudson's Bay and St. Lawrence systems of drainage has an elevation of 500 feet above the present level of Lake Superior. It appears to be the abandoned bed of a large river. Now one of the most heavily marked of the abandoned strand lines has an altitude of 509 feet above the lake. It may be inferred that Stage XXX. of the lake was determined by the altitude of this pass to the north. About 50 miles north-east of Michipicoten harbour there is another pass, at an altitude of 440 feet; if it ever served as an outlet to Lake Warren it is doubtless to be correlated with Stage XXVI., which has a strongly-marked strand line at Sault Ste. Marie. There are other possible outlets: the valley of the St. Croix River, the Illinois River, the Fort Wayne channel, the Nipissing depression, and the Whitefish Valley through Little Bay de Noc.

The Geography of Ecuador.—With a volume entitled 'Geografia y Geologia del Ecuador,' Don Teodoro Wolf, the government geologist, publishes an important map of Ecuador, on which he has been occupied for the last fifteen years. It supersedes the worthless compilation of Villavicencio, which appeared in 1858. All the parts of Wolf's map have not the same value. Some extensive portions, especially in the coast provinces, are based on exact triangulation, others on compass surveys, while compilation from older maps had to be resorted to for unvisited districts. On the whole, the result is very successful, and Mr. Wolf has produced a map which is beyond comparison superior to anything that has gone before. His chief merit is in having surveyed the coast region between the Pacific and the Cordillera, from the Tumbez on the Peruvian, to the Mira on the Colombian frontier, a region previously almost unmapped, and filled up by Villavicencio with imaginary ranges. Mr. Wolf found many corrections to be necessary in the interior regions, even where the French Academicians and Humboldt had worked. The eastern part of Ecuador within the Amazonian valley, except the courses of the larger rivers, remains unexplored and unknown. Mr. Wolf gives a lucid general description of the orography of Ecuador, and enables the student to understand the general features of the Cordilleras, as well as to become acquainted with their geographical details. He also explains the geological conformation, and devotes chapters to the meteorology and to biological distribution. He refers, with appreciation, to the labours of Mr. Whymper; and acknowledges the value of the little map drawn by our Associate,

Mr. Spruce, to illustrate his report on the red-bark trees (*Cinchona succirubra*) of Ecuador. Both Mr. Wolf's map, and the volume which accompanies it, are valuable contributions to geographical knowledge.

The Upper Amazons.—Richard Payer, whose energetic efforts in behalf of improved communication between Peru and the Atlantic have been noted from time to time for some years past in *Petermanns Mitteilungen*, in a recent number describes his latest journey from Lima to Iquitos on the Upper Amazons, by way of the Ucayali. Besides giving a vivid picture of the difficulties of travel along the steep and slippery paths in the Andes, and down the rushing streams, which flow from their eastern slope, his letter contains interesting notes on the Tyrolese colony, which for over forty years has maintained a precarious existence on the Pozuzo, one of the side feeders of the Ucayali system, but which is now at last in course of extinction through the migration of most of the families to a more favourable climate on the Ochobamba Plateau. The difficulties which the German settlers have had to contend against arose partly from the nature of the spot chosen (these might have been avoided had recourse been had to the experience of disinterested persons at the outset) and partly from the jealousy and opposition of the Peruvians, which went so far as to stir up the natives against the settlers. The writer comments severely on the want of energy and judgment shown by the Peruvian authorities, which renders fruitless all efforts to improve the communication between Lima and the Upper Amazons, as well as on the recent attempts to attract fresh German settlers, while no steps are taken to provide help or accommodation for them in the wilderness to which they are invited. The colony of Pozuzo was founded by Damian v. Schütz and the priest, Joseph Egg, for emigrants who came mostly from the German Tyrol and from the Rhine. Although its chances for progress were great, it has not increased as it ought to have done, on account of the causes already noted, the unsettled state of the Peruvian Government, and the war between Peru and Chile (1879–1882). V. Schütz, just before his death (1883), gave an exhaustive account of his work in his book called 'Amazonas.' According to Payer coca could have been cultivated with profit in Pozuzo, and last year a French company was even contemplating to raise capital for that purpose. The number of the colonists was five hundred and fifteen at the end of last year, to which may be added about one hundred and thirty Indians and half-castes. The principal products are tobacco, and coffee, and coca. A German has founded a factory of cocaïne in Lima, where the coca of Pozuzo finds ready sale. The neighbourhood is free from epidemic diseases, and its only physician (a homœopath) is the already-mentioned Tyrolese priest, Joseph Egg, who has laboured faithfully amongst the emigrants for the last thirty-five years. During the years 1874–1889, when no subsidy arrived from his Government, the priest earned his living as a turner, making spinning wheels.

Soil and Vegetation of the North-West Argentine Republic.—Dr. L. Brackebusch, of Cordova, who has for some years been occupied in collecting material for a comprehensive work on the physical geography of the Argentine Republic, though the publication at Government expense has been interrupted by the financial crisis, deals, in *Petermanns Mitteilungen* for July last, with the conditions of soil in the north-west part of the Republic, with special reference to the vegetation. His paper is illustrated by two maps, one showing the relief of the land, the other the distinctive characteristics of soil and vegetation in its various parts. Two areas of inland drainage are distinguished, one a plateau region, mainly included within the higher ranges of the Cordillera, the other that of the streams

which flow from the eastern slopes, but eventually lose themselves in the plains below. There are two other hydrographical regions, that of the tributaries of the Parana in the north, and that of the streams which, when full, find their way to the Rio Colorado in the south. The principal natural divisions of the country dealt with are the snowy summits, volcanoes, and sterile ridges of the Cordilleras; and, in descending order, high-level sand-dunes, slopes of *débris*, Alpine pastures, low-level dunes, salt flats, forests, and pampas. The upper sand-dunes show much analogy with glaciers, descending the upper valleys under the action of the winds. They are composed of the *débris* of volcanic and other crystalline rocks, which become mingled and constantly ground smaller whilst carried along by violent storms. The lower dunes, which stretch eastwards from the foot of the mountains, are likewise brought by the winds from the bare slopes of glacial *débris* which fringe the outer ranges. The salt-flats owe their origin, in Dr. Brakebusch's opinion, to the salt brought by streams from the Western Cordillera, which contains jurassic and cretaceous strata of marine origin, including even now beds of rock-salt. Many of the streams which now reach the Colorado once formed stagnant lakes on the sites of the present salt-flats. The Alpine pastures, of varying character, support horses, cattle, goats, swine, and sheep where free from bush. They pass more or less gradually into forests, either the sub-tropical moist forests of the lower slopes, or the dry forests of the Chaco. The former especially supply timber, while the best bark for tanning is obtained from the latter, which may be again subdivided according to the species of trees which predominate. Cultivation is most extensive in the districts to the east, where the rainfall is more abundant and regular. In the more inland parts it can only be carried on with the aid of irrigation.

The Andes of Western Colombia.—Dr. Hettner, whose monograph on the Andes of Bogotá was noticed in the *Proceedings* for December last, has lately given in *Petermanns Mitteilungen* a sketch of the mountain system of the West of Colombia. The two main chains here form direct continuations of those of Ecuador, from which they differ however in showing fewer traces of volcanic action. North of 4° N. lat. a separate coast chain, with strata of recent formation, appears. Volcanoes occur only in the most southerly portion of the western chain, which is remarkable for its regularity and even direction. North of the transverse valley of the Patia, the greatest height reached is 11,150 feet, and the lowest pass 6725 feet. In the south the spurs sink at right angles to the main ridge, while further north several parallel ridges occur. The central depression is mainly occupied by the longitudinal valleys of the Patia and Cauca, and only in the south is it formed, as in Ecuador, by a series of basins, sending their waters east or west. The Cauca, which flows partly through plains of horizontal recent formations, and partly through rocky defiles, penetrates within the Central Cordillera by a bend between 5° and 6° N. lat. In the last-named range volcanoes are found further north than in the Western, a broken series of volcanic peaks reaching as far as 5° N. lat., in parts above the snow-line. The two chains seem to unite in the mountain complex of Antióquia. Of the arrangement of the ridges here little is known, but the most important seems a northern continuation of the western chain. In the Andes of Western Colombia the constituent rocks are chiefly gneiss, crystalline slates, and granite, with strata of cretaceous and, perhaps, tertiary age. In parts the cretaceous strata seem to pass gradually into crystalline slates in the neighbourhood of eruptive rocks. On the whole, the formations to the west are of later date than to the east. All, except the quaternary, are tilted, and the range is therefore one of elevation and mainly of tertiary age. The central depression

may be compared to that of the Upper Rhone and Rhine, but the presence of volcanoes suggests that its formation was more largely due to fracture. The range of Santa Marta resembles the group of Antióquia in structure, and probably forms the continuation of this, the main line of the Andes, the Cordillera of Bogotá being really a distinct chain.

AUSTRALASIA.

Australian Settlers and the Native Flora.—The *Journal* of the Royal Society of New South Wales for 1892 publishes a paper entitled "Effect of Settlement on Indigenous Vegetation in Australia," by A. G. Hamilton, who deals with the subject under the main headings of (1) The actual destruction of the flora in clearing land, with the indirect action of the latter through alteration of surface, climate and fauna; (2) The effect on the flora of the introduction of a new fauna, and destruction of the native animals; (3) The modification of the flora by the competition of introduced plants. Few statistics as to the destruction of forests in the various colonies are available, but in New South Wales, where the original forest area (principally on the coast district, table-lands, and mountains), may be estimated at about one-third of the colony, it seems that at least a third has been swept away within a century, in clearing for cultivation, roads, townships, etc., and in felling timber. Many of the most valuable kinds of timber trees, especially the group of eucalypts known as "iron barks," have been nearly exterminated in parts, and others are becoming scarce. It may be hoped, however, that reforestation of various districts will be carried out under the present Government policy. Not only are the forest trees destroyed in clearing, but the whole flora which sprang up under their shade is affected, and as is seen in many other parts of the world, if the ground is left fallow a distinct set of plants takes its place, pines and wattles often springing up where other forest is cleared, while isolated big trees left standing do not long survive their fellows. An instance is given where the light let in by clearing a road benefited certain species of trees, rare before, so that a perfect hedge of these sprang up on each side of the cleared space. The removal of the protection afforded to the soil by grass and herbage has an important effect in altering the surface drainage. Channels are cut, and much soil removed, the roots of neighbouring trees being laid bare, and the moisture necessary for their growth drained off. The much-vexed question of the effect of forests upon rainfall is discussed by the writer, who gives it as his opinion that deforesting does not diminish rainfall, but that it dries the air, and increases the effects of hot winds, besides causing the water to drain more readily out of the soil. These results, he thinks, have a decided effect in modifying the flora. The checking of bush fires, which have an important influence on the flora, benefiting some plants and injuring others, must have acted in just the converse ways. Of introduced animals, rabbits do immense damage to vegetation, especially in dry seasons, when hunger drives them to attack plants which they do not usually touch. While these injure pastures especially, hares principally attack crops and introduced trees. The indigenous flora also suffers much from the pasturing of cattle and sheep, owing to the over-stocking which is prevalent, and which threatens the prosperity of the colony, unless suitable measures, such as the storage of fodder, or the conservation of rainfall for irrigation, are resorted to. The paths made by cattle on hill-slopes also alter the surface drainage in a way similar to that mentioned above. The effects which may be produced by modification of the fauna are very various, owing to the complex relations existing between different groups of organic beings. Thus the destruction of the insect-eating marsupials would lead to the increase of certain insects which may be either

beneficial or hurtful to plants, while that of the dingo has led to a great increase of grass-eating marsupials, and plants have been largely affected thereby. Under the last heading the writer shows how various plants are introduced, and how railways, roads and enclosures help them to spread, while the fact that the Australian flora has for so long been removed from outside competition places it at a disadvantage as against old-world weeds, which under competition have acquired an adaptability to varying circumstances. These conditions do not always last, however, as the native plants sometimes recover a portion of the lost ground. In conclusion a list of introduced plants, with an indication of some of the reasons which have helped them to spread, is given.

The Delimitation of the Anglo-Dutch Boundary in New Guinea.—For a long period the Tugeri tribes which live on the Dutch side of the 141st meridian of east longitude—the nominal boundary line between the two powers in that region—have proved a great source of trouble to the administration of British New Guinea, by their constant piratical raids into our possession. Their depredations are chiefly made against the tribes about the mouth of the Fly and Maikassa Rivers. Since these districts lie far distant from the headquarters of the Government, it has invariably happened that by the time that a protective or punitive force could reach the scene, the marauders, whose descents are naturally not intimated beforehand, have made off across the boundary into Dutch territory, whither the administrator has no right to follow them. The Netherlands Government have none of their officers stationed anywhere near this boundary—a low-lying, very unhealthy region of no commercial importance, at present at least. It constantly happens, therefore, that these Tugeri pirates escape scot-free. Sir W. Macgregor has, we believe, more than once given them chase and pursued them to a certain point. But for his uncertainty of the actual position of the boundary-line, and his desire not to carry war into the territory of a friendly neighbour, he would have continued till he had come up with them. He has long urged on the government the necessity for fixing a boundary more recognisable when reached than a meridian. It is satisfactory, therefore, to learn that the delimitation was effected in the most friendly manner in the beginning of March last by Resident Beusbach, of Ternate, and Sir W. Macgregor, respectively representing the sovereigns of the two countries concerned. An interesting account of the proceedings is given in a despatch from the Administrator of British New Guinea to the Governor of Queensland, by whom it has been communicated to the Secretary of State for the Colonies. As a Dutch man-of-war visited the locality some years ago and marked a tree near the 141st meridian of east longitude, the Dutch officers knew approximately where the boundary was. It was, therefore, arranged to land at a small creek—now called Java Creek, about 3 miles west of the boundary—and attempt to fix the position. The coast there unfortunately proved so muddy and swampy that no landing could be effected. A few miles further west, however, a large freshwater creek was discovered, now named Beusbach Creek, where, although it was not a very satisfactory place, the observing instruments were mounted. The officers of the Dutch war-vessel *Java* were provided with very excellent instruments, while those possessed by Sir William Macgregor and Mr. Cameron, Government Surveyor, were smaller and less perfect. Lieut. Meyjes, of the *Java*, accomplished his task in one day, while the Administrator and his companion were obliged to remain ashore for two days and nights to try to obtain between the rain squalls, which unfortunately prevailed, the necessary sights. The result of the observations of Lieut. Meyjes, R.D.N., placed the spot of observation in 9° 7′ 34″·9 S. lat., 141° 1′ 47″·9 E. long., while those of Sir

William Macgregor and Mr. Cameron made it 9° 7′ 42″ S. lat., and 141° 1′ 46″·1 E. long., both positions depending on the position of the Admiralty observing spot at the Post Office, Thursday Island, being 10° 35′ 8″·13 S. lat., and 142° 13′ 14″·4 E. long. After considering the whole subject on the data at their disposal, and after Resident Beusbach had visited the boundary, both representatives agreed to recommend to their respective Governments that the boundary should be as follows:—Beginning on the south coast of New Guinea, at the middle of the mouth of the Beusbach River, which is about latitude 9° 7′ 35″ S. lat., and 141° 1′ 48″ E. long., proceeding thence northwards on the same longitude until the line meets the Fly River, about latitude 7° S., thence following the Fly River until it reaches the 141° of E. longitude about latitude 6° 20′ S., thence along the line of 141° of E. longitude to the point where the British, Dutch, and German boundaries meet in 5° S. latitude. A small strip of useless British territory of about 280 square miles would pass to the Netherlands, and some 280 square miles would pass from the Netherlands to the British Crown. On the coast there would be a well-defined boundary that could not be lost or mistaken. It is a suitable place for ships to be posted in to intercept marauders, as there is shelter, concealment, and water. Anything that will facilitate the task of the Dutch Government in settling the Tugeri tribes will be of indirect advantage to the British. The Queensland Government has acquiesced in the proposed rectification, and it only now requires the confirmation of the two European Governments to be the future boundary of New Guinea in this region. The piratical visits of the Tugeri may now, with the facilities which the new boundary offers for checkmating them, be considered to be drawing to an end.

Chatham Islands.—The *Journal of the Polynesian Society* for June 1893 contains a continuation of Mr. A. Shand's interesting history of the Maori occupation of this group. The present instalment (Parts IV. and V.) describes the dissensions and fights that soon arose between the Maori tribes that had come over from New Zealand and taken possession of the country of the Morioris. Their final disposal in the islands was accomplished through the intervention of the New Zealand Company's agent, Mr. Hanson (afterwards Chief Justice of South Australia), while the intertribal discords ceased at last on the introduction of Christianity in 1842. Part V. gives an account of the migration of some of these Maori settlers, in 1843, to the Auckland Islands, "owing to the limited area of the Chatham Islands, taken together with the fact that many of the Maoris did not obtain land in their own right." "Tauru Matioro . . . with a number of Ngatimutunga taking their Moriori slaves with them, joined him in chartering a Sydney brig named *Hannah* and proceeded to those islands. Almost immediately after landing a party proceeded . . . to take possession of the island. On going over it, however, they found it was peaty, bleak, and evidently quite unsuitable for them to live on." Accordingly some of their number returned at once on board the vessel, which set sail in a surreptitious manner for the Chatham Islands, "leaving the greater number to get on as they best could at the Auckland Islands." Several years after their arrival a whaling party settled on the islands and remained for some years. During this time quarrels and dissensions had arisen among the Maoris, and when the whaling settlement broke up Matioro and a section of his party were taken to Stewarts Island. Meanwhile the relatives in the Chatham Island of those still left in the Aucklands chartered a vessel to bring them all home again. They first called at Stewarts Island, picked up those there, and proceeding to the Auckland Islands took on board the survivors of the migration and brought them to Waitangi. There they lived till 1868, when, after the escape of Te Kooti from

his "island prison" at the Chatham Islands, all "the Maoris, with the exception of a few, returned to their old homes in Tarauki, New Zealand, where they now live."

The Island of Niue.—By an unnoticed printer's error, a note relating to *Niue*, or Savage Island, in the August number, gave the name as Nine Island. The error has been pointed out by several correspondents, who state that the word is trisyllabic, pronounced Ni-u-e.

POLAR REGIONS.

Dr. Nansen's Progress.—Dr. Nansen telegraphs to the Society from Yugor Strait, at the entrance to the Kara Sea, on August 3rd, the message reaching the Vardö telegraph-office on August 23rd. All on board the *Fram* were in the best health and spirits, satisfied with their voyage so far, and full of hope for its final success. Leaving Vardö on July 21st (see *ante*, p. 174), a good voyage was made to Novaya Zemlya, the only unpleasant episodes being the occurrence of fogs and contrary winds. Gooseland, in Novaya Zemlya (lat. 72° N.), was sighted on the 25th. The telegram is a little obscure on this point, the literal reading being, "Passage from Norway to Novaya Zemlya good, only wind, fog, Goseland on Novaya Zemlya in it 25 July; met fog and contrary wind; met ice 27 July, 69 grades 50 minutes N.D. 50 grades E. gr." The probable meaning is that the *Fram* was driven off her course by the contrary wind, and so came in sight of Novaya Zemlya too far north. Turning southward she took two days to make 150 miles, and on the 27th ran into the ice in lat. 69° 50′ N., long. 50° E., about 10 miles north-east of the Island of Kolguev. The telegram goes on to state that they forced their way through the ice, the *Fram* proving a splendid ship for the purpose, and reached Yugor Strait on the 29th, making a run of 250 miles in two days. Considering the low speed and small engine-power of the *Fram* this was a remarkable passage in an ice-encumbered sea. The coal-ship which was to have been waiting at Yugor Strait had not arrived, but having sufficient coal on board Dr. Nansen intended to sail into the Kara Sea on August 3rd rather than risk delay by waiting. He took on board the "thirty-four splendid sledge-dogs from Siberia" which were waiting for his arrival. Yugor Strait was found to have been open since July 3rd, and little ice was reported in the southern part of the Kara Sea, a fortunate southerly wind having driven the pack northward. The best route eastward was close along the shore keeping to the open water, and Dr. Nansen considered his prospects very favourable. If the ice does not turn out worse than reported he hoped to reach the New Siberian Islands before the end of August, and if he does so he considers success almost certain. The *Fram* will touch at the Olonets River near the Lena delta, if there is time, and Dr. Nansen will send farther news from there. The telegram concludes with "hearty greetings" to the Society. The following are the names of Dr. Nansen's companions:—

Captain Otto Sverdrup, master of the ship; Sigurd Scott Hansen, lieutenant in the Norwegian Navy, director of the astronomical, meteorological, magnetical, and other observations; Henrik Blessing, surgeon and botanist; Claudius Theodor Jacobsen, mate; Peder Henriksen, harpoonist; Anton Amundsen, first engineer; Lars Pettersen, second engineer; Hjalmar Johannesen, lieutenant in the Norwegian Army, at present fireman on board, but prepared to turn his hand to anything; Bernhard Nordahl, electrical assistant; Ivar Otto Irgens Mogstad, carpenter and general utility man; Adolf Juell, steward.

Lieutenant Peary's Arctic Expedition. — Mr. E. Astrup, second in command of Lieutenant Peary's expedition, which recently started, writes to a correspondent as follows:—"Sealer *Falcon*, July 5th, 1893. On this journey we really start from the terminal point of last expedition, and our firm intention is not to rest until we have mapped the entire north-east shores of Greenland and any adjacent islands; and, if fortunate, we hope to proceed further north still. In his land journeys Peary relies entirely on the strength of man, and the endurance of the tough, frugal North Greenland dogs. Without the latter, any inland journey would be futile. His outfit is of the simplest kind, this expedition having cost only about £4,450 to equip, and we are fourteen persons provisioned for over two years. Our prospects are most promising. Our house for winter quarters will be larger than last year's—33 feet by 14 feet, and contain several rooms. It will be heated with paraffin stoves, and lighted with twenty glow-lamps. The latter will be a capital boon, our dynamo being worked by the engine of our steam launch. The launch cannot fail to be of very great use for our scientific excursions, when the water is open. Our provisions consist of all the usual kinds of dried and tinned foods, but we partly rely on the delicious reindeer-meat to be got in Greenland as well. The accoutrement of sledges, ski, arms, and tents is complete; likewise our collection of instruments. We have several large cameras for photographs, and a phonograph, in which we hope to collect specimens of the Eskimo dialect, songs, and melodies. Another novelty is the attempt to use Colorado mules on the ice; they are said to be very enduring, and can stand the severest cold. Their special purpose is to carry our stores from the winter quarters on the shore up to the inland ice, for our journey, a distance of 6 miles, includes a rise of 5000 feet. This work nearly killed us last time. Of dogs, we have on board two St. Bernards and six Eskimo, the latter being survivors from the last expedition; but more will be purchased in South Greenland, so that, on arriving in Whale Sound, we shall have about a hundred, which will not be at all too many. We have been obliged to take our dogs thus far away, as it is to be feared we nearly exhausted the stock of our northern friends in 1892. Mrs. Peary again accompanies her husband, an especially courageous act, as she is expecting shortly to become a mother. Her attendant and cook is a Mrs. Cross. Dr. Vincent, the surgeon, is a new member, twenty-eight years of age. Mr. Entrikin, engineer, is to build our house, whilst Peary maps Inglefield Gulf, and I undertake a journey right away to Independence Bay, with Messrs. Carr and Lee, meteorologist and zoologist respectively. An artist, Mr. Stokes, is also a member."

GENERAL.

The Improvement of Geographical Teaching.—Professor W. M. Davis writes on "The Improvement of Geographical Teaching" to the July number of

The National Geographic Magazine. He believes that improvement is demanded in three directions—a fuller investigation of facts, a better knowledge of the facts by teachers, and a more skilful use of them in the processes of teaching. The want of detailed personal exploration of the neighbouring country, and the old-fashioned and lifeless geographical descriptions in the text-books are mentioned as the main hindrances to an exact knowledge of geographical facts. What is wanted is not simply a description of the forms of the land, but a recognition of the forms as dependent on structure and sculpture, and a comparison of like and unlike forms. Professor Davis illustrates his meaning by references to New England geography, where the uplands, with their residual mountains, represent the closing stages of one cycle of development, and the valleys represent the beginning of another; and by a comparison between the New England plateau and the Hunsrück-Taunus plateau. He shows how all geographical features studied out in such a manner became luminous and interesting to scholars and teachers. The results of glacial action, too, are overlooked by most American text-books, yet evidences of these must be familiar to every schoolboy. Professor Davis does not think any progress can be made in his scheme of systematic geography without the recognition of two principles. The first is that every land-form passes through a systematic series of changes from its youth, when its form is defined chiefly by constructional processes, past its maturity, when the processes of sub-aerial sculpture have carved a variety of mouldings and channellings, to its old age in which denudation reduces the mass to base-level. This unmeasured time he calls a geographical cycle. The second principle is that during a geographical cycle a land-area may be disturbed by depression or elevation; the combination then developed produces "composite topography." A recognition of these principles would greatly advance the descriptions, and the appreciation of geographical conditions. Professor Davis urges on the directors of the various state geological surveys, to devote some time to the study of the physical features of their state in the light of modern geographical science; and he concludes by asserting the great need of text-books, prepared by persons familiar with local geography.

Political Division of the Earth.—A. Oppel (*Ausland*, 1893, No. 5) divides all the lands of the Globe into three classes, viz.: (1) The uninhabited or "owner-less" tracts, such as the ice-covered portion of Greenland, total area, 1,694,000 square miles; (2) Those with no definite political organisation, as the Sahara, etc., total area, 5,023,000 square miles; and (3) States, with an area of 45,100,000 square miles. Under the last heading both colonies and protectorates are assigned to the respective mother-countries, the minimum extent being allowed in cases of uncertainty. Thus Bokhara, Sokoto, Matabeleland, etc., rank as states, while the Galla countries come under the second main heading. Of a total of seventy-five states, eighteen (comprising 87 per cent. of the surface occupied by the whole) have an area of over 1,000,000 square kilometres, or about 386,000 square miles each; thirty-six have over one-tenth of that amount; and twenty-two a still smaller area. Venezuela comes within the first group, but not Spain; while Bulgaria stands at the head of the third. More than half of the total area is occupied by European states and their dependencies, these last being five and a half times larger than the continent of Europe itself. Twenty-six states are republics and forty-nine monarchies, the former occupying roughly two-sevenths of the whole area. The population of the states taken together is estimated at 1,420,000,000, and of the tracts without that status about 45,000,000. The British and Chinese Empires together include about half the population of the states, and European countries roughly account for four-sevenths.

OBITUARY.

Dr. John Rae, F.R.S.—An old hero of Arctic travel has passed away, in the person of Dr. John Rae, who died at his house in Addison Gardens on July 22nd last. Although eighty years of age, Dr. Rae enjoyed excellent health to within a few months of his death, and took a prominent part in the proceedings of the Royal Geographical Society, the Colonial Institute, and other public bodies, and in all matters relating to the regions where the greater part of his early life was passed. The qualities which fitted him so pre-eminently for the arduous service he performed in high latitudes also ensured him popularity and esteem at home. The geniality of his manner, and his readiness to help, by advice or instruction, will long be lovingly remembered by many. Dr. Rae was a keen sportsman and an ardent volunteer; he himself attributed much of his success in exploration to the certainty of his aim; and on all his expeditions he kept his party supplied with food by his gun.

Born in Orkney on September 30th, 1813, Rae found himself from his earliest years in an environment of adventure; and he must have been familiar from infancy with stories of the Arctic fur-traders and whalers, since Orkney and Shetland have always been the recruiting ground for whalers and the Hudson's Bay Company. At an early age Rae went to Edinburgh to study medicine, and there he qualified as a surgeon in 1833. His first professional experience was a voyage in one of the Hudson's Bay ships, and this proved so much to his mind, that he joined the service of the Company, and for ten years resided at Moose Factory. It was not, however, until June 1846 that he set out on his first journey of pure exploration—a boat voyage along the coast of Hudson's Bay to Repulse Bay. Here he passed the winter successfully, and early in the following year made a long land journey, in which he surveyed 700 miles of new coast-line, connecting the surveys of Ross in Boothia with those of Parry at Fury and Hecla Strait. The only book Dr. Rae published was a short account of this expedition, which appeared in 1850 under the title, 'Narrative of an Expedition to the Shores of the Arctic Sea.'

A visit to London was shortened by Dr. Rae joining the expedition down the Mackenzie River in search of Sir John Franklin under Sir John Richardson in 1848. Another very interesting journey was the result, in the course of which the whole coast of the Arctic Sea between the Mackenzie and the Coppermine Rivers was explored. In 1851, at the request of Government, Rae undertook a new expedition in which, with the slenderest outfit possible, he explored and mapped the south coast of Wollaston Land and Victoria Land in search of news of Franklin. A slight conception of the enormous difficulties which attended land travel in Canada in those days is given by the fact that on the return journey Rae had to walk on snow-shoes, dragging a sledge all the way, from the Arctic Sea through Fort Garry (now Winnipeg) into United States territory before he could get any other means of conveyance to an open seaport. The expedition mapped 700 miles of new coast. Returning to London Dr. Rae received the gold medal of the Royal Geographical Society, which was presented in a speech full of cordial appreciation by Sir Roderick Murchison.

In 1853 the Hudson's Bay Company fitted out another boat expedition, on the express condition that Dr. Rae should take command. This he did and with even more than his customary success. His surveys proved the insular character of King William's Land, and his intercourse with the Eskimo elicited the first definite information as to Sir John Franklin's fate, and secured many relics of the gallant officers who had stuck to their duty until, as the Eskimo said, "they

dropped down as they walked and died." For this discovery the Admiralty awarded to Dr. Rae the grant of £10,000, offered by Government for the first authentic news of the lost expedition; and although the search for Franklin was not stopped the subsequent expeditions only succeeded in substantiating Rae's report.

This was the last piece of purely Arctic work he did, although in 1860 and following years he travelled through Iceland, Greenland, and various parts of North America, surveying for telegraph lines, always doing his work with great accuracy and making observations of wide scientific value.

Dr. Rae was a man of action with a constitutional shrinking from multiplying words. The reports of his journeys published in the *Journal*, R.G.S., Vol. XXII., pp. 73, 82, and Vol. XXV. 246, are brief and unadorned. Latterly Dr. Rae read several papers to the British Association on the navigation of Hudson's Bay, on the best route for Polar exploration, which he believed to be by Spitzbergen, and on the depth of permanently frozen soil in North America, but these are only published in abstract. He was the author of several papers on the Eskimo, a people whom he had very carefully studied. Dr. Rae attributed his own success in Arctic travel to his power of living in Eskimo fashion. To save carrying a tent he frequently built a snow-hut every night as he travelled, and his skill as a sportsman enabled him to reduce the supply of preserved provisions very greatly. Altogether he walked over 23,000 miles in the course of his Arctic journeys.

Dr. Rae served on the Council of this Society on four occasions, and frequently acted on Committees dealing with Arctic questions. He has been buried in Kirkwall, and it is proposed to erect a memorial in the ancient cathedral of St. Magnus in that town.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.

THE following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce, Commercial.
C. R. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
J. = Journal.
M. = Mitteilungen.
Mag. = Magazine.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue, Revista.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.

On account of the ambiguity of the words *octavo*, *quarto*, &c., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half inch. The size of the *Journal* is 10 × 6½.

EUROPE.

Austria—Adriatic. *Deutsche G. Blätt.* **16** (1893): 127–149. **Gelcich.**

Die österreichisch-ungarischen Kurorte am Adriatischen Meere. Von E. Gelcich.

Notes on the climate and other conditions of the eastern Adriatic health resorts, especially Abbazia, the island of Lussin, Cirkveniza, and Grado.

Austria—Bohemia. *Ausland* (1893): 353–355, 372–375. **Günther.**

Der Kammerbühl. Eine vulkanistische Studie. Von S. Günther.

British Islands. *Scottish G. Mag.* **9** (1893): 393–402. **Dickson.**

On Sunshine. By H. N. Dickson, F.R.S.E.

The question as to what constitutes sunshine is discussed from the meteorological standpoint, and the recent Meteorological Office report on the Sunshine of the British Islands is summarised. The paper is illustrated by a map—we believe the first of its kind—showing the geographical distribution of sunshine in the British islands.

Greece—Zante. *Petermanns M.* **39** (1893): 166–174. **Mitzopulos.**

Das grosse Erdbeben auf der Insel Zante im Jahre 1893. Von Prof. Dr. Constantin Mitzopulos in Athen. *Map.*

Pyrenees. **D'Almeida.**

Les Pyrénées. Developpement de la Connai-sance Géographique de la Chaîne. Par P. Camena D'Almeida. Paris, Armand Colin et Cie. *Not dated* (1893): size 9 × 5½, pp. 328. *Presented by the Author.*

This valuable monograph on historical geography will be noticed separately.

Rhine. *M. k.k. G. Ges. Wien.* **36** (1893): 315–328. **Oelwein.**

Die Regulirung des Rheines zwischen Vorarlberg und der Schweiz und die Entwässerung des Tieflandes. Von Prof. A. Oelwein.

Russia—Baltic Provinces. **Bielenstein.**

Die Grenzen des Lettischen Volksstammes und der Lettischen Sprache in der Gegenwart und im 13. Jahrhundert. Ein Beitrag zur ethnologischen Geographie und Geschichte Russlands. Von Dr. A Bielenstein ev.-luth. Pastor zu Doblen in Kurland. Mit einem Atlas von 7 Blättern. St. Petersburg, 1892: size 13½ × 10, pp. xvi. and 548. *Price 7 roubles.*

The record of thirty years' research investigating in minute detail a small but important department of the historical geography of Europe. The first part (only 24 pp.) summarises the present distribution of the Letts, who number about a million and a quarter. Part II., comprising all the rest of the work, relates to the distribution of the various Lettish tribes in the 13th century, with many valuable remarks on ancient geography and the origin of place-names.

Switzerland—Thur. *Vierteljahrschrift Naturforsch. Ges. Zurich* **38** (1893): 108. **Eberli.**

Eine Flussablenkung in der Ostschweiz. Von Dr. J. Eberli in Zürich. *With map.*

The River Thur before the Ice-age is shown to have turned westwards and flowed into the Töss; but the formation of a moraine across its upper valley diverted the stream which now flows eastward and joins the River Sitter.

ASIA.

Afghanistan—Herat. *Scottish G. Mag.* **9** (1893): 403–8. **Yate.**

Colonel Yate's Mission to Herat and the Kushk Valley. By Captain A. C. Yate, I.S.C.

Himalaya. *Verh. Ges. Erdk. Berlin* **20** (1893): 297–313. **Diener.**

Herr Dr. Carl Diener: Ueber seine Expedition in den Central-Himalaya von Kumaon, Hundes und Garwhal. *With map.*

India, Ancient Topography. *Indian Antiquary* **22** (1893): 169–195. **Fleet.**

The Topographical List of the Brihat-Samhita. By J. F. Fleet, PH.D.

A list with notes indicating the probable position of the places mentioned in the Brihat-Samhita of Varahamihira, intended as a contribution towards the preparation of a map of ancient India, which may be added to by similar lists and discussions of the places mentioned in other books.

India. **Birdwood and Foster.**

The Register of Letters, &c., of the Governor and Company of Merchants of London Trading into the East Indies, 1600–1619. Edited by Sir George Birdwood, M.D., K.C.I.E., assisted by William Foster, B.A. London, Quaritch, 1893: size 10 × 6¼, pp. lxxxiv. and 530. *Presented by the Publisher.*

This first letter-book of the East India Company is richly annotated by Sir George Birdwood, and contains in quaint form a wealth of information as to the commencement of British influence in India.

India—Economic Products. **Watt.**

A Dictionary of the Economic Products of India. By George Watt, M.B., C.M., F.L.S., assisted by numerous contributors. Vols. i. to vi. (parts i. and ii.) Calcutta (London, W. H. Allen & Co.), 1889–1893. Size 10 × 6¼. *Presented by the Government of India.*

In compiling the present work Dr. Watt has made use of a number of standard works dealing with the products of India, a list of which follows the preface; he has also derived much assistance from specialists, no pains having been spared to ensure accuracy and completeness. The articles mainly deal with the botanical products of India, in most cases including medical notes, and are sufficiently full and comprehensive for all ordinary purposes.

Indo-China—Tribes. *B. American G. S.* **25** (1893): 289–303. **Rosset.**

The Wild Peoples of Farther India. By C. W. Rosset, Freiburg in Baden.

Notes, with illustrations, of the Mois, Stieng, Ahong and Beunong peoples inhabiting the country between 11° and 13° N., and 106° 20′, and 108° 20′ E.

Korea. *S. Normande G.* (*Rouen*) **14** (1892): 384–418, **15** (1893): 1–18. **Chaillé-Long.**

La Corée ou Chöson (la Terre du calme matinale). Par M. le Colonel Chaillé-Long-Bey. *With map of Quelpart.*

Malay Archipelago. *Ausland* (1893): 357–360, 375–378, 391–393. **Bergemann.**

Der Malayische Archipel im Lichte des Zeitalters der Entdeckungen. Von P. Bergemann (Jena).

Siam. *Rev. Française* **17** (1893): 538–545. **Demanche.**

La France et le Siam au Laos. [Par] G. Demanche. *With map.*

Siberian Railway. *Petermanns M.* **39** (1893): 102–112. **Immanuel.**

Russische Eisenbahnbauten in Asien in ihrer Bedeutung für die Landeskultur und der Weltverkehr. Von F. Immanuel. *With map.*

AFRICA.

Angola. *B. American G. S.* **25** (1893): 304–312. **Chatelain.**

Geographic Names of Angola, West Africa. By Heli Chatelain. *With map.*

Egypt. **Robecchi-Bricchetti.**

All' Oasi di Giove Ammone. Viaggio di L. Robecchi-Bricchetti con 164 incisione e una grande carta geografica. Milano, Fratelli Treves, 1890: size 12 × 8½, pp. 374. *Presented by the Author.*

A finely illustrated account of a journey to the oasis of Jupiter Ammon in the Libyan Desert.

Madagascar. *Z. Ges. Erdk. Berlin* **28** (1893): 137–160. **Voeltzkov.**

Von Beseva nach Soalala, Reiseskizze aus West-Madagaskar. Von Dr. A. Voeltzkow in Mojanga.

This paper is illustrated by a map showing the route taken and the district explored on the journey.

Morocco. *Deutsche Rundschau* **15** (1893): 337–348, 437–448. **Rohlfs.**

Marokkanische Städtebilder. Von Gerhard Rohlfs. *With illustrations.*

Seychelles. *Rev. Française* **17** (1893): 433–447. **Fauvel.**

L'Archipel des Seychelles. Etude de Cartographie. Par. A. A. Fauvel.

Illustrated by reproductions of early maps of the islands.

Somaliland. **Robecchi-Bricchetti.**

Itinerario del viaggio da Obbia ad Alula dell' Ingegnere Luigi Robecchi-Bricchetti. Size 12½ × 8½, pp. 20, *maps*.

Tradizione Storiche dei Somali Miguirtini. Raccolta in Obbia dall' Ingegnere L. Robecchi-Bricchetti. Size 12½ × 8½, pp. 24. Rome, 1891. *Presented by the Author.*

These are reports published by the Italian Department of Foreign Affairs.

Somaliland. *B.S.G. Italiana* **6** (1893): 355–384. **Robecchi-Bricchetti.**

La prima traversata della Penisola dei Somali, dall'ing. L. Bricchetti-Robecchi. (*With map*).

South Africa. *J. R. Colonial Inst.* **24** (1893): 545–560. **Selous.**

Incidents of a Hunter's Life in South Africa. By F. C. Selous.

Togo. *M. Forsch. Deutschen Schutzgeb.* **6** (1893): 105–254. **Kling and Büttner.**

Ergebnisse der Forschungsreisen im Hinterlande von Togo 1890 bis 1892, von Hauptmann E. Kling und Dr. R. Büttner.

The whole third part of vol. vi. of this journal is occupied by an account of the journey into the hinterland of Togo, carried out by Kling and Büttner, including short articles by specialists on the various departments of natural history which were represented in the collections made. There is a map and a series of photographs showing the native types and characteristic scenery.

Tunis. **Pennesi.**

Tunisi e il suo nuovo porto. Prof. Giuseppe Pennesi. Estratto dalla Rassegna Navale. Anno. I. No. 7, size 10 × 7, pp 12. *Presented by the Author.*

Tunis. **Venukoff.**

M. Venukoff. La Tunisie contemporaine (février 1893). [In Russian.] Size 10 × 6½, pp. 29. *Presented by the Author.*

Uganda. *Ausland* (1893): 360–363, 378–381. **Förster.**

Die geschichtliche Entwickelung Ugandas von 1875–1892. Von Brix Förster. (München).

Uganda. *J. Manchester G. S.* **8** (1892): 101–114. **Lugard.**

Uganda: its value to British Trade. By Captain F. D. Lugard.

West Africa. *B.S.G. Lyon* **11** (1893): 585–613. **Monteil.**

De l'Atlantique a la Méditerranée par le lac Tchad. Par M. le commandant Monteil. *With map.*

West Africa. *B. S. Khédiv. G.* (1893): 717–759. **Rogozinski.**

Huit Années d'exploration dans l'ouest de l'Afrique Equatoriale, par le Comm. Etienne de Rogozinski.

NORTH AMERICA.

America—Discovery. *M. Verh. Erdk. Leipzig* (1892): 57–89. **Mogk.**

Die Entdeckung Amerikas durch die Nordgermanen. Von E. Mogk.

Mount St. Elias. *National G. Mag. (Washington)* **4** (1893): 63–67. **Mendenhall.**

The Geographical Position and Height of Mount Saint Elias. By Dr. T. C. Mendenhall.

The position found by the Boundary Commission in 1892 was 60° 17′ 35″ N. 140° 55′ 21·5″ W., and the mean height deduced from several triangulations 18,010 feet

United States—California. *Sierra Club B.* **1** (1893): 40–53. **Koch.**
Through Death Valley. A brief account of a trip from Daggett to Furnace Creek. By Fred. W. Koch.

United States—Census. *National G. Mag.* **5** (1893): 21–44. **Gannett.**
The Movements of our Population. By Henry Gannett.

This is the first comprehensive statement in convenient form of the results of the United States census of 1890. It is illustrated by a profusion of maps and diagrams, and will be summarised in our pages.

United States—Lakes. *B. American G. S.* **25** (1893): 203–223. **Brigham.**
The Finger Lakes of New York. By Albert P. Brigham.

United States—Louisiana. *B.S.R. Belge G.* **17** (1893): 164–177. **Serruys.**
La Louisiane sous la domination Espagnole. Par Edmond Serruys.

United States—Oregon. *Sierra Club B.* **1** (1893): 31–39. **Kerr.**
Crater Lake, Oregon, and the Origin of Wizard Island. By Mark Brickell Kerr. *Map and illustration.*

United States—Rainfall. *National G. Mag.* **5** (1893): 45–58. **Greely.**
Rainfall Types of the United States. Annual Report by Vice-President General A. W. Greely. *With map.*

CENTRAL AND SOUTH AMERICA.

Argentine Republic. *Petermanns M.* **39** (1893): 153-166. **Brackebusch.**
Ueber die Bodenverhältnisse des nord-westlichen Teiles der Argentinischen Republik mit Bezugnahme auf die Vegetation. Von Prof. Dr. Ludwig Brackebusch in Cordoba. *Maps.*

Brazil and Argentine. *B.S.R.G. Anvers* **17** (1893): 207–224. **Georlette.**
La Question des Limites entre le Brésil et la République Argéntine. Par M. F. A. Georlette. *Map.*

A discussion by the Consul General of Brazil in Belgium of the question at issue between Brazil and the Argentine republic, regarding the boundary territory which was formerly part of Paraguay.

British Guiana. *Timehri* **6** (1892): 258–303. **Hunter.**
Gold in British Guiana, its History and Prospects. By Hope Hunter.

Chiloe. **Beranger.**
Relacion Jeografica de la Provincia de Chiloé por Don Carlos de Beranger. Publicada por primera vez con una Introduccion i notas esplicativas por Nicolas Anrique R. Santiago de Chile. Imprenta Cervantes, 1893. Size 9½ × 6½, pp. 64. *Presented.*

This pamphlet contains little of importance regarding the present condition of Chiloe.

Colombia—Andes. *Petermanns M.* **39** (1893): 129–136. **Hettner.**
Die Anden des westlichen Kolumbiens. Eine orographische Skizze. Von Dr. Alfred Hettner.

Dominica. *Globus* **63** (1893): 365–369. **Krause.**
Dominica. Reiseerinnerungen von Dr. med. Ernst H. L. Krause. Kiel. *With illustrations.*

Ecuador, Quito. *Z. Ges. Erdk. Berlin* **28** (1893): 107–136. **Hann.**
Ueber das Klima von Quito, von J. Hann.

A discussion of the climate of Quito, mainly from the data contained in Dr. Wolf's work on Ecuador.

Guatemala. *Globus* **63** (1893): 265–267. **Sapper.**

Ein Ausflug nach der Südgrenze von Guatemala. Von Dr. Karl Sapper, Coban.

Guatemala—Volcanoes. *Globus* **64** (1893): 1–5, 27–31. **Sapper.**

Die Vulkane der Republik Guatemala von Dr. Karl Sapper. Coban. *With map.*

Honduras. *B. American G. S.* **25** (1893): 224–235. **Perry.**

Honduras, by E. W. Perry.

A sketch of the geography and present condition of the Republic of Honduras.

Nicaragua. *Science* **21** (1893): 174–177. **Crawford.**

Hydrographic Area of the Rio Wanque or Coco in Nicaragua. By J. Crawford, Cape Gracias al Dios, Nicaragua.

Some useful details concerning the rivers, natural resources and people of the basin of the boundary river between Nicaragua and Honduras.

Nicaragua. *B. American G. S.* **25** (1893): 236–288. **De Kalb.**

Nicaragua, Studies of the Mosquito Shore in 1892. By Courtney de Kalb.

An article of some interest in view of the international aspects of the Nicaragua Canal. It commences with a historical survey of British intervention on the Mosquito coast, goes on to give a graphic description of the character of the country and of the people, amongst whom Moravian missionaries have been established for forty years, describes their government and laws, showing how while nominally independent under Nicaraguan control the coast is really under the commercial rule of British traders and the ecclesiastical control of Prussian pastors, and concludes with a review of the outlook for the future.

Peru—Campa Indians. *Scottish G. Mag.* **9** (1893): 348–359. **Urquhart.**

Among the Campa Indians of Peru. By D. R. Urquhart, C.E.

A sketch of the habits and customs, etc., of the little-known Campa Indians of the upper tributaries of the Amazon.

AUSTRALASIA AND PACIFIC ISLANDS.

New Caledonia. *Miss. Cathol.* **25** (1893): *p.* 20, *passim to p.* 129. **Lambert.**

Les Hypogées de l'Ile des Pins (Nouvelle Calédonie) Etude d'archéologie païenne. Par le R. P. Lambert.

POLAR REGIONS.

Arctic Travel. **Heilprin.**

The Arctic Problem and Narrative of the Peary Relief Expedition of the Academy of Natural Sciences of Philadelphia. By Angelo Heilprin. Philadelphia: Contemporary Publishing Co., 1893. Size 9 × 6, pp. 166. *Presented by the Author.*

There are six chapters in this little book, dealing respectively with The Arctic Problem, Polar Expeditions, The Spitzbergen Route to the Pole, The Peary Relief Expedition, A Lost Companion (the story of Mr. Verhoeff, naturalist in Peary's party, who mysteriously disappeared just before the return voyage began), and The Greenland Ice-cap and its Glaciers. Professor Heilprin has studied his subject fully, and appears to have come to reasonable and well-balanced conclusions as to the manner in which future Arctic work should be carried out.

Keenan Island. *National G. Mag.* (*Washington*) **4** (1893): 76–83. **Baker and others.**

An Undiscovered Island off the Northern Coast of Alaska. I., by Marcus Baker; II., by Captain Edward Perry Herendeen; III., by General A. W. Greely.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Astrolabe. *J. Asiatique* **1** (1893): 5–76, 185–231. **Sauvaire, &c.**

Sur une *Mère* d'Astrolabe Arabe du XIII^e^. siècle (609 de l'hégire) portant un Calendrier perpetuel avec Correspondance Musulmane et Chrétienne. Traduction et Interprétation M. H. Sauvaire et M. J. de Rey-Pailhade.

A learned paper describing, with illustrations, part of a remarkable instrument which was found by M. Sauvaire in Cairo in 1873, and explaining its application to a perpetual calender.

Forests and Climate. *Meteorol. Z.* (*Vienna*) **10** (1893): 201–214. **Ebermayer.**

Klimatische Wirkung des Waldes auf seine Umgebung. Von E. Ebermayer.

Physical Geography. **Geikie.**

Fragments of Earth Lore, Sketches and Addresses, Geological and Geographical. By James Geikie, D.C.L., LL.D., F.R.S. Edinburgh, John Bartholomew & Co., 1893: size 10 × 6½, pp. vi. and 428. *Price* 12*s.* 6*d.* *Presented by the Publishers.*

Professor Geikie's scattered papers on glaciation and physical geography published during the last few years are here collected in a handsome volume, with illustrations, and particularly aided by a fine series of maps by Mr. Bartholomew. The papers on the Ice-age, although geographical in their bearing, are purely geological in form, and their argument is somewhat technical, although, like everything Professor Geikie writes, they are shot through with veins of the richest and least obtrusive humour. The more distinctly geographical papers include one on the interesting subject "Geography and Geology," one on the "Physical Features of Scotland," and several on special regions of that country, such as the Cheviot Hills and the Outer Hebrides. Three essays of much wider scope show to the best advantage their author's powers of cautious generalisation and luminous exposition, the subjects being "The Geographical Evolution of Europe," "The Evolution of Climate" (involving the order of appearance of the continents), and "The Geographical Development of Coast-lines." The last-mentioned was the opening address of Section E of the British Association last year, and is printed in the *Proceedings*, vol. xiv., p. 639.

GENERAL.

Biography—Fischer. *Deutsche Rundschau* **15** (1893): 518–520. **Umlauft.**

Theobald Fischer, von F. Umlauft. *With portrait.*

Biography—Hartmann. *Deutsche Rundschau* **15** (1893): 471–473. **Wolkenhauer.**

Robert Hartmann, von W. Wolkenhauer.

Dr. Robert Hartmann, of whom a portrait is given, was Professor of Anatomy in the University of Berlin. He travelled in North-east Africa, and was the author of many contributions to anthropology. He died in April 1893.

Biography—Müller. *Deutsche Rundschau* **15** (1893): 469–471. **Umlauft.**

Friedrich Müller, von Friedrich Umlauft. *With portrait.*

Biography—Ratzel. *Deutsche Rundschau* **15** (1893): 423–425. ——

Friedrich Ratzel. *With portrait.*

Cabot. *B.S.G. Madrid* **34** (1893): 69–94. **Duro.**

Los Cabotos Juan y Sebastian, descubridores en el Continente americano. Por D. Cesareo Fernandez Duro.

Columbus. *Quarterly Review*, *No.* 353 (1893): 1–41. ——

The Discovery of America.

Columbus. *B. American G. S.* **25** (1893): 1–63. **Daly.**
Have we a Portrait of Columbus? Annual Address by Charles P. Daly, LL.D., President.

Judge Daly answers his question in the affirmative, and enters into a critical examination of the various portraits claiming to be authentic. He considers the Lotto portrait which the United States Government adopted for commemoration on coins and stamps as of doubtful authenticity. The paper is well illustrated.

Education. *National G. Mag.* (*Washington*) **4** (1893): 68–75. **Davis.**
The Improvement of Geographical Teaching, by Professor William Morris Davis.

Geographical Names. *B. S. Khédiv. G.* (1893): 685–701. **Bonola.**
La Question des Noms Géographiques en Égypte, par F. Bonola Bey.

Malaria. *Scottish G. Mag.* **9** (1893): 281–302. **Clark.**
Remarks on Malaria and Acclimatisation. By H. Martyn Clark, M.D., of Amritsar.

Mountaineering. *B. G. Club, Philadelphia* **1** (1893): 1–32. **Balch.**
Mountain Exploration. By Edwin Swift Balch. *Illustrations.*

A vindication of the geographical importance of mountaineering.

Place-Names. *Ausland* **66** (1893): 465–471. **Egli.**
Der Völkergeist in den geographischen Namen. Von J. J. Egli (Zurich).

Political Boundaries. *M. Verh. Erdk. Leipzig* (1892): 1–54. **Förster.**
Zur Geographie der politischen Grenze mit besonderer Berücksichtigung curvimetrischer Berechnungen der sächsischen und Schweizerischen Grenze. Von Dr. Clemens Förster.

Races. **Pearson.**
National Life and Character. A Forecast, by Charles H. Pearson. London, Macmillan & Co., 1893: size 9 × 6, pp. 358. *Price* 10*s.*

Mr. Pearson, impressed with the geographical fact that the higher races only flourish in the temperate zone, while many of the lower races of mankind are cosmopolitan, endeavours to arrive, by reasoning, at the probable changes in national character likely to result in the near future.

Tropical Hygiene. *Ausland* **66** (1893): 449-451, 471–474. **Sucro.**
Beitrag zur Hygiene in den Tropen mit Rucksicht auf die Arbeitsverhältnisse im Pflanzerleben auf Sumatra Von R. Sucro (Deli auf Sumatra).

Practical observations on the health of workmen in tropical countries, especially with regard to the plantations of Sumatra.

NEW MAPS.

By J. COLES, *Map Curator*, R.G.S.

EUROPE.

England and Wales. **Ordnance Survey.**
Publications issued since July 12th, 1893.

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ENGLAND AND WALES: **Blackburn,** LXII, **12,** 12, 3*s.*; 13, 4*s.*; 17, 4*s.*; 19, 5*s.*; 22, 4*s.*; 24, 5*s.*; LXII. **15,** 18, 3*s.*; 19, 5*s.*; 20, 11*s.* 6*d.*; 23, 4*s*; 24, 8*s.*; 25, 8*s.*; LXII. **16,** 17, 8*s.*; 19, 8*s.*; 21, 8*s.*; 23, 8*s.* (coloured). **Sheffield** (Yorkshire), CCXCIV. **3,** 6, 8, 16, 5*s.* each; CCXCIV. **4,** 12, 5*s.*; CCXCIV. **6,** 5, 4*s.*; CCXCIV. **8,** 9, 5*s.*; CCXCIV. **15,** 3, 4*s.*; CCXCV. **1,** 7, 5*s.* This town is now complete. **Stockton-on-Tees** (Yorkshire), L. **12,** 9, 4*s*; 10, 3*s.*; 13, 4*s.*; 14, 5*s.*; 15, 5*s.*; 18, 5*s.*; 19, 8*s.*; 20, 5*s.*; 23, 8*s.*; 24, 11*s.* 6*d.*; 25, 5*s.*; L. **16,** 2, 5*s.*; 3, 8*s.*; 4, 8*s.*; 5, 5*s.*; 6, 4*s.*; 7, 5*s.*; 8, 8*s.*; 9, 5*s.*; 10, 5*s.*; 11, 5*s.*; 12, 5*s.*; 13, 8*s.*; 14, 8*s.*; 15, 8*s.*; 17, 5*s.*; 18, 5*s.*; 19, 5*s.*; 20, 11*s.* 6*d.*; 24, 5*s.*; 25, 5*s.*; LI. **9,** 11, 3*s.*; 16, 4*s.*; 21, 3*s.*; LI. **13,** 11, 3*s.*; 16, 5*s.*; 21, 5*s.* This town is now complete in 37 sheets (coloured). **Withington** (Lancashire), CXI. **6,** 15, 4*s.*; 19, 5*s.*; 20, 5*s.*; 24, 5*s.*; CXI. **7,** 3, 5*s.*; 6, 5*s.*; 12, 4*s.*; 16, 5*s.*; 21, 4*s.*; CXI. **10,** 10, 5*s.*; CXI. **11.** 1, 3*s.*; 6, 5*s.*; 11, 8*s.*; 21, 5*s.*; 22, 5*s.* (coloured).

(*E. Stanford, Agent.*)

England. **Bartholomew.**

Plan of Bournemouth with Environs. Scale 490 yards to an inch. *Price* 2*s.* Map of Keswick, Ullswater, &c. Scale 1 : 63,360, or one statute mile to an inch. By J. Bartholomew. London, W. H. Smith & Son. *Price* 1*s.* *Presented by the Author.*

Europe. **Bartholomew.**

The Tourist's Atlas-Guide to the Continent of Europe. A series of section maps and plans, with notes for travellers, by J. G. Bartholomew, F.R.G.S. London, George Philip & Son, 1893. *Price* 5*s.* *Presented by the Publishers.*

In addition to numerous maps and plans, this little atlas contains useful notes as to hotels, objects of interest, &c. These latter are necessarily very brief and general, and it is questionable if too much has not been attempted within the limited space afforded by so small an atlas.

Russia. **Comité Géologique, St. Petersburg.**

Carte Géologique de la Russie d'Europe éditée par le Comité Géologique a l'Institut des Mines, St. Pétersbourg, 1892. Scale 1 : 520,000, or 8·2 statute miles to an inch. Par A. Karpinsky, S. Nikitin, Th. Tschernyschev, N. Sokolov, A. Mikhalsky, etc. With explanatory text. *Price* 7 *roubles.* *Presented by the Comité Géologique, St. Petersburg.*

Previous to the appearance of this geological map of European Russia, the only one, on a scale large enough to be of any practical service, was that which was

prepared by Sir Roderick Murchison in 1845, of which several editions have since been published. The present map has been issued by the Geological Committee of the Institute of Mines, St. Petersburg, and is published by them in commemoration of the tenth year of the existence of the Committee. The important work of compilation was entrusted to MM. A. Karpinsky, S. Nikitin, T. Tschernyschev, N. Sokolov, and A. Mikhalsky. The colours in which the map is printed are well chosen. A full explanation of their signification is given of these, which, as well as the lettering of the map, is in Russian character. The map is, however, accompanied by a pamphlet in French, which contains full explanatory notes.

Servia. **Servian General Staff.**

General-Karte des Königreiches Serbien. Scale 1 : 200,000, or 2·7 geographical miles to an inch. Bearbeitet und herausgegeben vom kgl. Serbischen grossen Generalstabe. 9 grosse Blätter u. 8 Klappen mit Plan von Belgrad 1 : 50,000, or 1·4 inch to a geographical mile. Belgrad 1893. In Commission bei Artaria & Co. in Wien. *Price* 25 *marks.*

This is a nine-sheet map of Servia. It is printed in colours; the areas covered with forests are shown in green, the hill-shading in brown, water in blue, and the main roads in red. In addition to the principal map, there is a plan of Belgrade, and the title-page contains a table showing the administrative divisions, and an explanation of the signs and colouring used in the map. The lettering is in Russian character.

Spain. **Instituto Geográfico y Estadístico Madrid.**

Mapa Topográfico de España en escala de 1 : 50,000 or 1·26 inches to a stat. mile. Comienza su publicacion el Instituto Geográfico y Estadístico, bajo la direccion del Exčmo. Señor Don Cárlos Ibañez é Ibañez de Ibero, Director General, con el concurso de Jefes y oficiales de Artilleria, Ingenieros y Estado Mayor, Astrónomos, Ingenieros de Caminos, Canales y Puertos, de Minas y de Montes, Cuerpo of Topógrafos y Auxiliares de Geodesia. Madrid, 1892–93. Sheet No. 766, Valdeganga, Provincia de Albacete. 790, Albecete. 816, Peñas de San Pedro, Provincia de Albacete.

ASIA.

Siam. **Johnston.**

Map to illustrate the Siamese Question showing the present limits of French Claims, and the additional Territory now demanded, July 1893. Scale 1 : 6,000,000, or 94·7 stat. miles to an inch. With insets of the World on Mercator's Projection, and Asia. W. & A. K. Johnston, Edinburgh and London. *Price* 6*d.* *Presented by the Publishers.*

AFRICA.

East Central Africa. **Höhnel.**

Provisorische Original-Karte der Expedition Wm. Astor Chanler's vom Tana-Fluss zum Guasso-Njiro. Aufgenommen u. gezeichnet von L. R. v. Höhnel K. u. K. Linienschiffslieutenant. Scale 1 : 500,000, or 7·8 stat. miles to an inch. *Petermann's Geographische Mitteilungen.* Jahrgang, 1893. Tafel 9. Gotha, Justus Perthes. *Presented by the Publisher.*

AMERICA.

Argentine Republic. **Brackebusch.**

Höhenschichten-Karte des nordwestlichen Teiles der Argentinischen Republik, von Prof. Dr. Ludwig Brackebusch. Scale 1 : 3,000,000, or 47·8 stat. miles to an inch. Physiographische Karte des nordwestlichen Teiles der Argentinischen Republik, von Prof. Dr. Ludwig Brackebusch. Scale 1 : 3,000,000, or 47·8 stat. miles to an inch. *Petermann's Geographische Mitteilungen.* Jahrgang, 1893. Taf. 10 u. 11. Gotha, Justus Perthes. *Presented by the Publisher.*

British Columbia. **Chief Commissioner of Lands and Works, B.C.**

Map of the South-Western part of British Columbia. Compiled by direction of the Honourable F. G. Vernon, Chief Commissioner of Lands

and Works. Victoria, B.C., 1892. Scale 1 : 750,000 or 11·8 statute miles to an inch. (*Stanford.*)

On this map the boundaries of the several districts of the south-western portion of British Columbia are shown, and all existing means of communication are laid down. With the exceptions of Mount Baker in the State of Washington, and Crown Mount in the Nootka District of Vancouver's Island, there is no hill-shading. In the New Westminster district, on the mainland, the survey sections on either side of the Fraser River are shown, and also in the northern portion of Vancouver's Island. The map is printed in colours, but in the absence of hill-shading it fails to convey an accurate idea of the mountainous character of the country.

GENERAL.

Historical Geography. **Schrader.**

Atlas de Géographie Historique. Ouvrage contenant 54 grandes Cartes doubles en couleurs, accompagnées d'un Texte Historique au dos et d'un grand nombre de Cartes de Détail, Figures, Diagrammes, etc. Par une Réunion de Professeurs et de Savants, sous la direction géographique de F. Schrader, directeur des travaux cartographiques de la librairie Hachette et C^ie^. *Price of each part* 1 *fr.* 50 *centimes.* Paris, Hachette et C^ie^, 1893.

This is the first issue of a new historical atlas which is being compiled under the direction of Monsieur F. Schrader, director of the cartographical works of Hachette & Co., Paris. After the issue of the second part, which will appear in October, one will be published every month until it is completed. Part I. contains a map of Greece in the time of Pericles, the world at the epoch of the great discoveries, Europe from 1715 to 1893. The maps are very nicely drawn, and several insets are given. On the back of the maps there are copious historical notes, which add considerably to their value. If this part may be taken as a fair specimen of those that are to follow, it will, when complete, be a very useful and carefully executed atlas.

The World. **Johnston.**

W. & A. K. Johnston's Royal Atlas of Modern Geography. Edition in monthly parts. Part 22. W. & A. K. Johnston, Edinburgh and London. *Price* 4*s.* 6*d. each. Presented by the Publishers.*

Sheet 36 is a map of Oceania, containing insets of Western Australia, Tasmania, Fiji Islands, and Eastern extremity of New Guinea. Sheet 43 is a map of Egypt, Arabia Petræa, and Lower Nubia, with insets of Cairo, Alexandria, and the Suez Canal. Special pains appears to have been taken to bring the maps up to date, and, as usual with this atlas, each map is accompanied by an index.

CHARTS.

Admiralty Charts. **Hydrographic Department, Admiralty.**

Charts and Plans published by the Hydrographic Department, Admiralty. May and June, 1893. *Presented by the Hydrographic Department, Admiralty.*

No.			Inches.	
1684	m	=	4·0	Mediterranean, Thaso Island:—Panagia Road. 1*s.* 6*d.*
1880	m	=	6·0	Mediterranean, Gulf of Xeros:—Suvla Bay, Arapos.
	m	=	12·0	Mermedia Bay. 1*s.* 6*d.*
1932	m	=	3·0	Newfoundland, east coast:—Orange Bay. Head of
	m	=	4·9	Pigeonnière Arm. Head of Soufflets Arm. 1*s.* 6*d.*
299	m	=	4·3	Newfoundland, west coast:—Currant Island to Bird Cove. 2*s.* 6*d.*
1731	m	=	1·5	Canada, Lake Huron:—Parry Sound and Approaches. 3*s.* 6*d.*
479	m	=	various.	West Indies, Anchorages in Puerto Rico:—Mona Island. Aguadilla Bay. Puerto de Guanica. Mayaguez Bay. Port Ponce. (*Re-published.*) 1*s.* 6*d.*
1792	m	=	3·0	North America, west coast, Admiralty Inlet:—Port Townsend and Kilisut Harbour. 1*s.* 6*d.*

No.			Inches.	
7	m	=	1·0	Gulf of Aden:—Aden and adjacent bays. Aden Anchorage. (*Re-published.*) 2*s.* 6*d.*
	m	=	10·0	
1798	m	=	0·75	China, north coast:—Kwang tung Peninsula, showing approaches to Port Arthur. 1*s.* 6*d.*
1716	m	=	0·4	Australia, north-west coast:—Jones Island to Cape Voltaire, including the Holothuria Banks. 2*s.* 6*d.*
1963	m	=	0·4	British New Guinea:—Kiriwina or Trobriand Islands. 1*s.*
1579	m	=	1·0	South Pacific, New Hebrides Islands:—Malepula Island, southern part. 2*s.* 6*d.*
2701	—	—	—	Gulf of Cattaro to Corfu:—New plan, Port Otranto.
1454	—	—	—	Pribiloff Islands:—Plan added, English Bay.
724	—	—	—	Islands and reefs between Seychelles and Madagascar:—New plan, Bird Island. Plan added, Dennis Island.

(*J. D. Potter, Agent.*)

CHARTS CANCELLED.

No.		Cancelled by—	No.
299	Old Férolle Harbour and Brig Bay ..	New plan. Current Island to Bird Cove	299
660	Ste. Geneviève Bay ..	New plan. Current Island to Bird Cove	299
479	Anchorages in Puerto Rico Island	New plans. Anchorages in Puerto Rico Island	479
500	Port Ponce	New plans. Anchorages in Puerto Rico Island	479
7	Aden and adjacent bays	New plan. Aden and adjacent bays	7

CHARTS THAT HAVE RECEIVED IMPORTANT CORRECTIONS:

No. 915, Wales, Milford Haven:—Pembroke Reach. 2306, Norway, west coast:—Romdals Islands to Hitteren Island. 2307, Norway, west coast:—Smölen to Sve Fiord. 2295, Norway, west coast:—Trondhjem Bay, Orland Bay. 2308, Norway, west coast:—Brand Fiord to Lekö. 2309, Norway, west coast:—Lekö to Donnæso. 2643, France, west coast:—Raz de Sein to Goulven. 2235, Black Sea:—Anakria Fort to Kertch Strait. 2205, Black Sea, Kertch Strait. 2733, Iceland: Portland to Snefells Jökel. 305, Gulf of St. Lawrence:—Lake Island to Pashasheeboo Point. 1621, North America, east coast:—Entrance to the River St. Lawrence. 266, North America, east coast:—Great Egg Harbour to Albemarle Sound. 355a, 355b, North America, east coast:—Chesapeake Bay (2 sheets). 395, West Indies:—Los Roques to Cape La Vela. 2431, North America, west coast:—Port Simpson to Cross Sound. 2689, North America, west coast:—Haro and Rosario Straits. 2840, North America, west coast:—Haro Strait and Middle Channel. 579, North America, west coast: Fraser River to north-east point of Texada Island. 1822, Borneo:—Saráwak River. 2636, Eastern Archipelago:—Strait of Makassar, north part. 2662, Eastern Archipelago:—Ports in Makassar Strait. 2764, Australia, east coast:—Coral Sea and Great Barrier Reefs. 2422, Australia, north coast:—Torres Strait, north-east and east entrances. 2423, Papua of New Guinea:—Boigu Island to Cape Blackwood. (*J. D. Potter, Agent.*)

French Charts. **Service Hydrographique de la Marine, Paris.**

No. 4735, Atterrages de Brest, France, 1893, 2 *fr.*—4385, Saint-Malo et Saint-Servan, Embouchure de la Rance, Côte Nord de France, 1892, 2 *fr.*—4665, Baie de Nhatrang et ses Environs, Hon Lon, Cua Bé &c^a., Côte d'Annam, Mer de Chine, 1893, 2 *fr.*—4600, Estuaire du Gabon Côte Ouest d'Afrique, 1892, 2 *fr.*—4600, Estuaire du Gabon, Côte Ouest d'Afrique, 1892, 2 *fr.*—4738, Estuaire du Gabon, Congo Français, 1893, 1 *fr.*—4723, Entrée de la Rivière Benito, Congo Français, 1893, 1 *fr.*—4782, Croquis de la Rivière Benito, Congo Français, 1893, 1 *fr.*—4715, Baie de St. Augustin, Côte S. O. de Madagascar, 1893, 2 *fr.*—4696, Baie de Diego-Suarez, Côte N.E. de Madagascar, 1893, 2 *fr.*—4734, Mouillage de Nosy Andrahombava, Mouillage de Nosy Hao, Baie Tsingilotilo, Côte Ouest de Madagascar (Cap St. Vincent) 1893, 1 *fr.*—4733, Cap St. Vincent

de la Baie Fanemotra à la Baie Tsingilofilo, Côte Ouest de Madagascar, 1893, 1 *fr.*—4767, Iles Barren et Atterrages de Maintirano, Côte Ouest de Madagascar 1893, 1 *fr.*—4716, Baie aux Lievres, Côte N.E. de Terre-Neuve, 1893, 2 *fr.*—4732, Baie San Miguel, embouchure du Fleuve Darien, Amérique du Sud, Côte Ouest, 1893, 1 *fr.*—*Presented by Service Hydrographique de la Marine, Paris.*

Indian Ocean. **Koninklijk Nederlandsch Meteorologisch Instituut.**

Waarnemingen in den Indischen Oceaan over de Maanden Maart, April en Mai. Koninklijk Nederlandsch Meteorologisch Institut. Utrecht, 1893. J. Van Druten. Verkrijgbaar bij H. G. Bom, Teevaartkundige Boekhandel. *Price* 5·50 *fl.*

This atlas has been compiled from a vast number of observations by the Koninklijk Nederlandsch Meteorologisch Instituut. The charts in the present part exhibit the meteorological conditions of the Indian Ocean during the months of March, April and May. Charts I., II., III. show the surface temperature of the water; IV. to IX. the currents; X., XI., XII., isobars; XIII., XIV., XV., temperature of the air; XVI., XVII., XVIII., the winds; XIX., XX., XXI., the rainfall, fogs, hurricanes, and hail; XXII., the mean state of the clouds; XXIII., the routes and limits of whales, flying-fishes, albatros, ice, drift-wood, and eddies; XXVI., tempests and the courses of cyclones. The charts have evidently been compiled with great care, and are accompanied by explanatory notes in French and Dutch; these might with advantage be extended.

Isle of Wight and Solent. **West and Collins.**

19 Charts of the Isle of Wight and Solent Tides, from Portland Bill to the Owers. By T. B. C. West and F. Howard Collins. London: J. D. Potter, 1893. *Price 7s. 6d. Presented by the Publisher.*

This series of charts is intended to represent, in a graphic form, the direction of the tidal streams from Portland Bill round both sides of the Isle of Wight to the Owers. The charts represent the state of the tide and the direction in which it runs at half-hourly intervals after and before high water. They have been engraved from the Admiralty chart, the arrows being placed in accordance with the information contained in the 'Channel Pilot,' published by the Hydrographic Office. The period embraced in the accompanying tide-tables is from May to October 1893; they are therefore each suited to meet the requirements of yachtsmen.

North Atlantic Ocean. **U.S. Hydrographic Office.**

Pilot charts of the North Atlantic Ocean for June, July, and August, 1893. Published at the Hydrographic Office, Bureau of Navigation, Navy Department, Washington, D.C. Charles D. Sigsbee, Commander U.S. Navy, Hydrographer. *Presented by the U.S. Hydrographic Office.*

Portuguese Charts. **Commissão de Cartographia, Lisbon.**

Planta hydrographica da Barra de Quelimane, Provincia de Moçambique. Scale 1 : 50,000, or 1·26 inches to a statute mile. Levantado em Dezembro e Janeiro de 1891–1892 pelo 2° tenente J. D. Leotte do Rego.—Plano hydrographico da Barra e Cruso do Rio Macuse, até 25 milhas da costa. Levantado de Maio a Julho de 1892 por J. D. Leotte do Rego 2° tenente da armada. Scale 1 : 109,612, or 1·7 stat. miles to an inch. Ministerio da Marinha e Ultramar, Commissão de Cartographia, Lisbon. *Presented by the Commissão de Cartographia, Lisbon.*

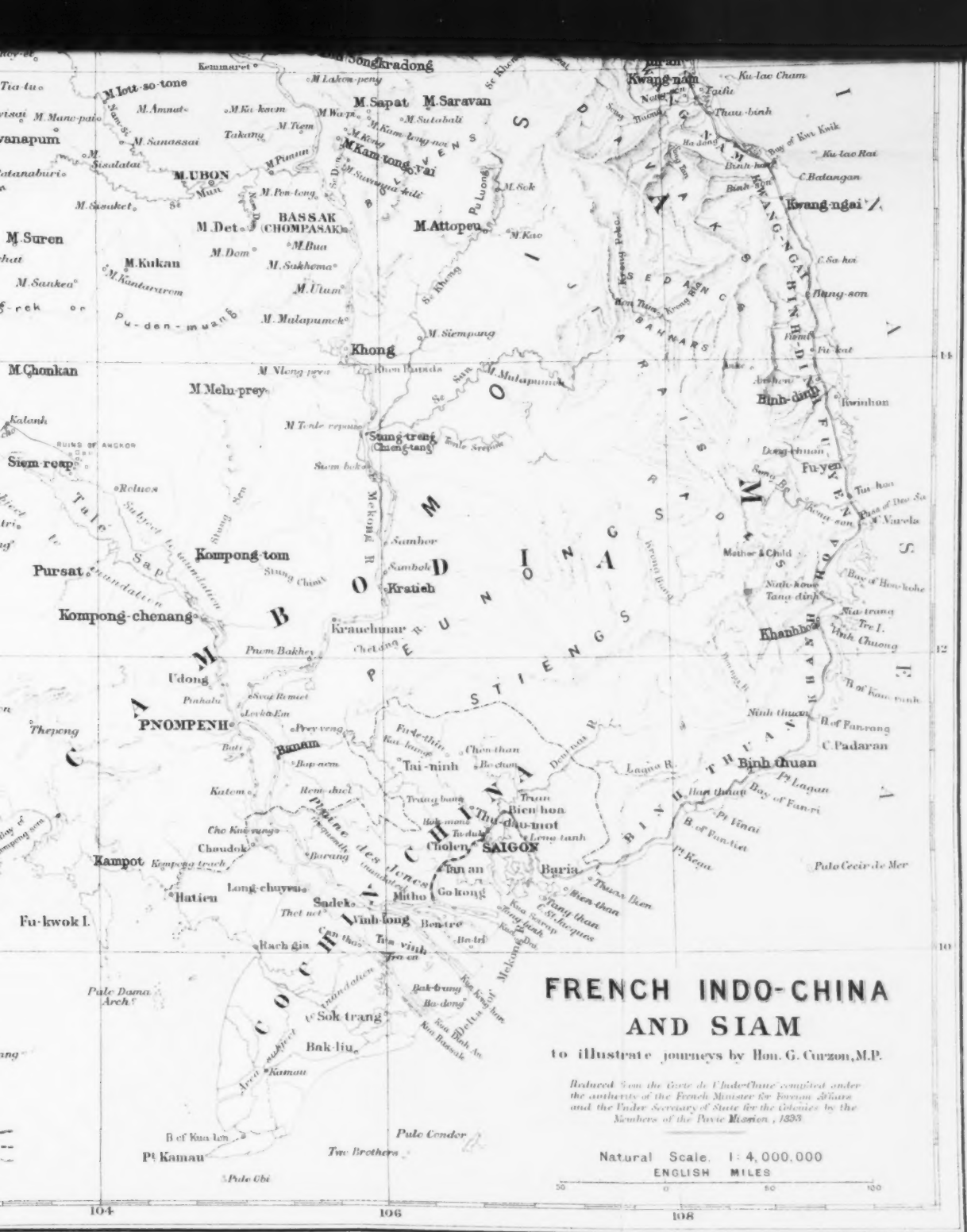
PHOTOGRAPHS.

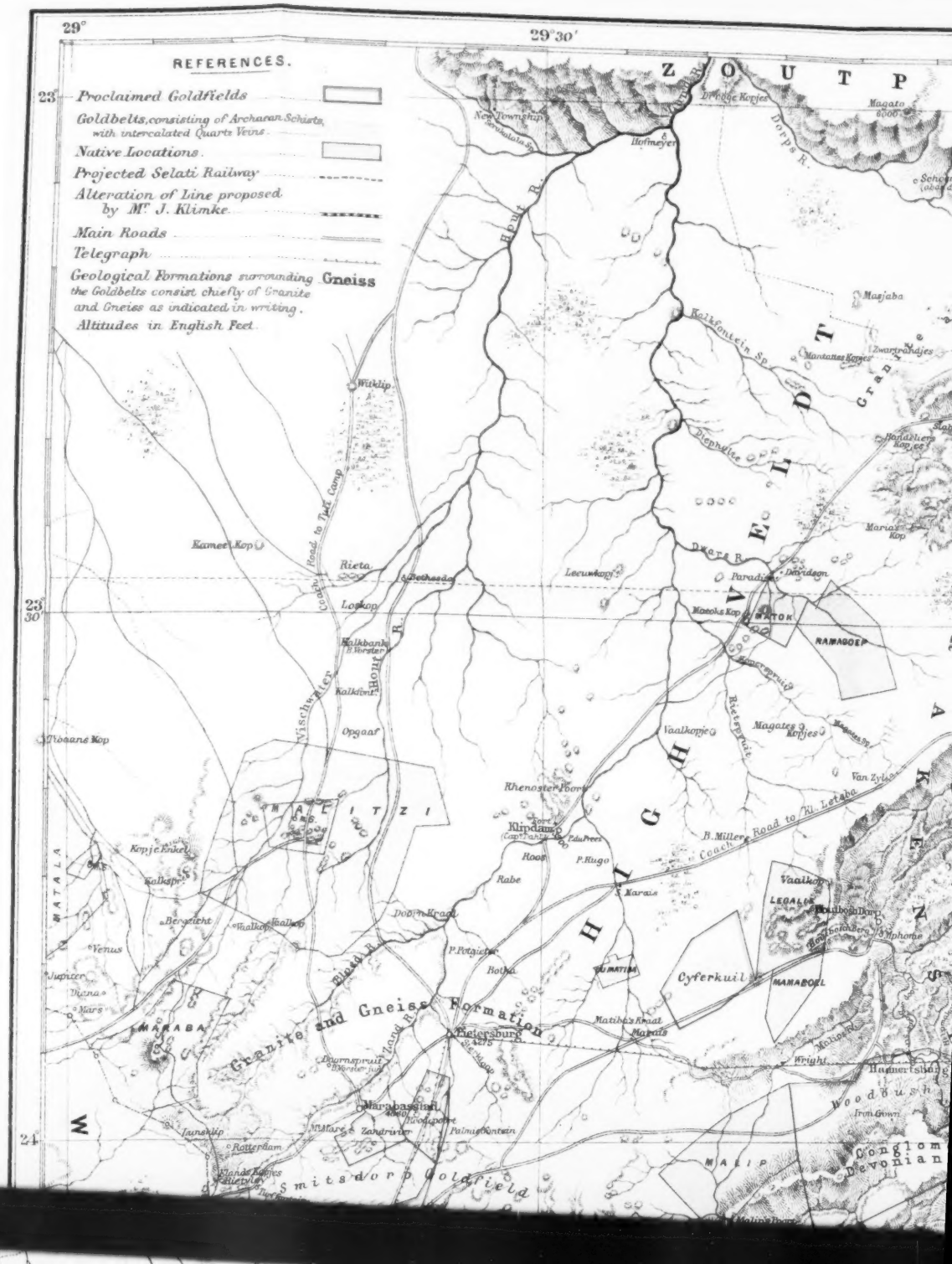
N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

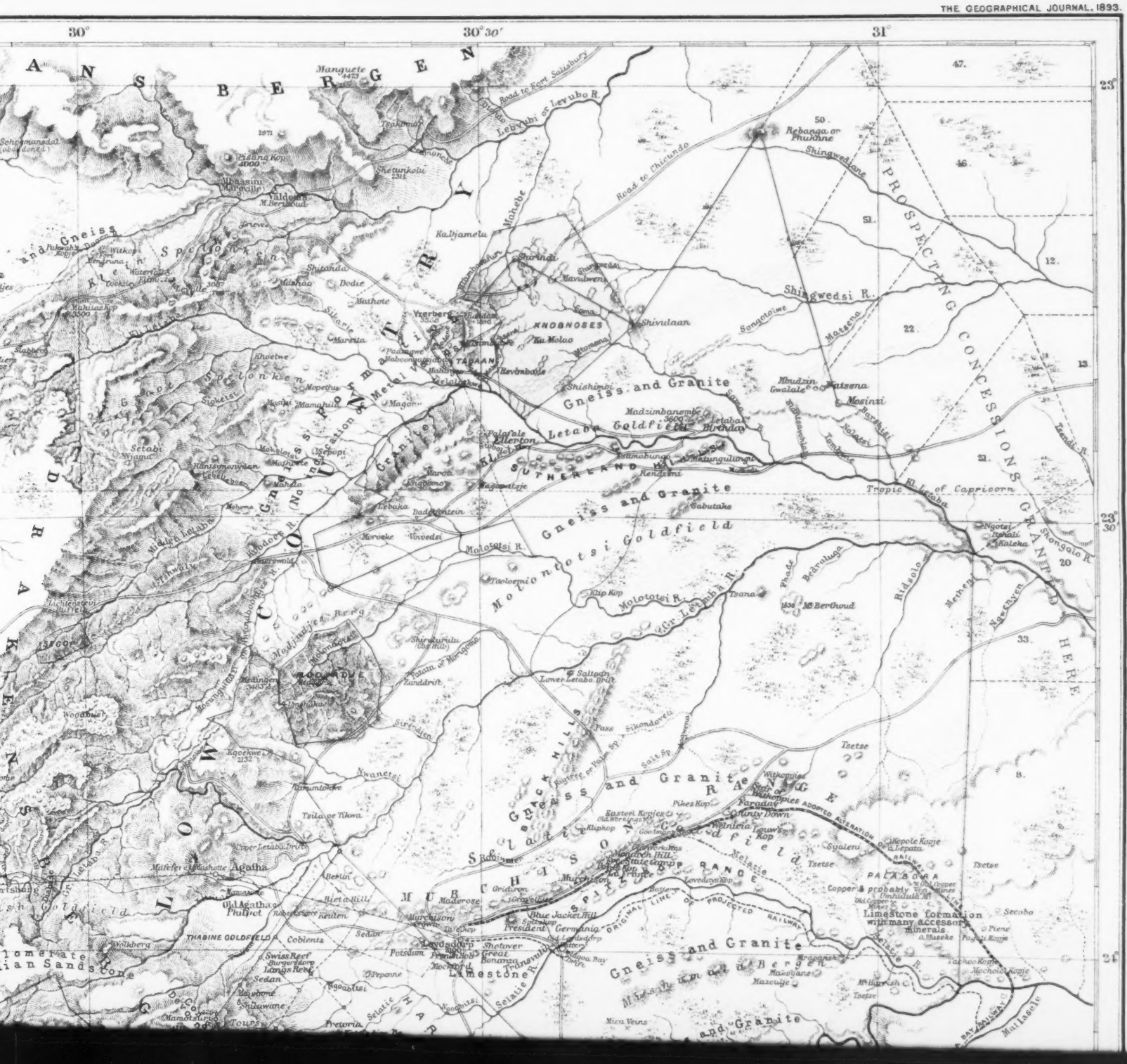
100
102
22
20
18
16
Talan
Pu-eul
Sumao
M. Meng
M. Vang
M. Pang
M. Bant
M. Kan
M. Lem
CHIENG HONG
M. Yang
M. Ham
M. Hai
M. Nun
M. Fang
BURMESE SHAN STATES
Chieng Kheng
CHIENG TONG
M. Kau
M. Pak
M. Yong
Chieng Lap
M. Kokko
M. Ialin
M. Luong
M. Sat
Chieng Seno
Chieng Kong
M. Nyon
Mt. Loko
Chieng Hai
M. Fang
V. Teun
Mekong R.
LUANG PHABANG
M. Pen
M. Len
M. Nam Kung
M. Ngen
M. Sim
Chieng Ngau
CHIENG MAI (ZIMME)
M. Lampun
M. Ngu
M. Tip
MUANG NAN
M. Wha
M. Sa
M. Lakom (Nakon Lampang)
M. Haut
M. Long
M. Pwai
M. Susakate
M. Hin
M. Tung
M. Wa
Pak-lai
M. Turakom
Vien-tiam (Wieng Chan)
SNONG-KAI
M. Teun
M. Fang
M. Nam-pat
M. Ken-tao
Utaradit
M. Tori
M. Sawankalok
M. Yom
M. Pichai
M. Siprom
M. Dan Sai
M. Nong-han
M. Sokotai
M. Nakon
Raheng
M. Pitsanulok
Muang Lom
M. Kampang
M. Pichit
M. Pechabun
M. Pu Kiu
M. Kasum (Mahasarakam)
M. Chenobet
M. Ban Pae
Pak-nam Po
M. Chaturat
Nam Ngum
Nam Suong
Nam Pong
Pu Vieng
Pu Nieul
Nam Tai
Nam Ta or Pa
Pu Ka
Nam Seng
Nam U
Pu Nam Bak
Pu Sung
Pu Luang
Pu Hoang
Pu Dan Dinh
Pu Papi
Dien-bien-fu
Mekong R.
Menam R.
Me Ing
Me Kok
Me Nam
Me Yang
Me Pang
Me Ping R.
Chieng Ran
Nam Ngum
Nam Suong
Nam Sane
Nam Hin
Nam Nyum
Nam Tai
Nam Sa
Nam Kan
Nam Ma
Nam Ka
Nam Ou
Nam Nga
Nam Beng
Nam Khan
Nam Lan
Nam Ngua
Nam Nyua
Nam Sane
Nam Hia
Nam Ou
Nam Ka
Nam Ma
Nam Kan

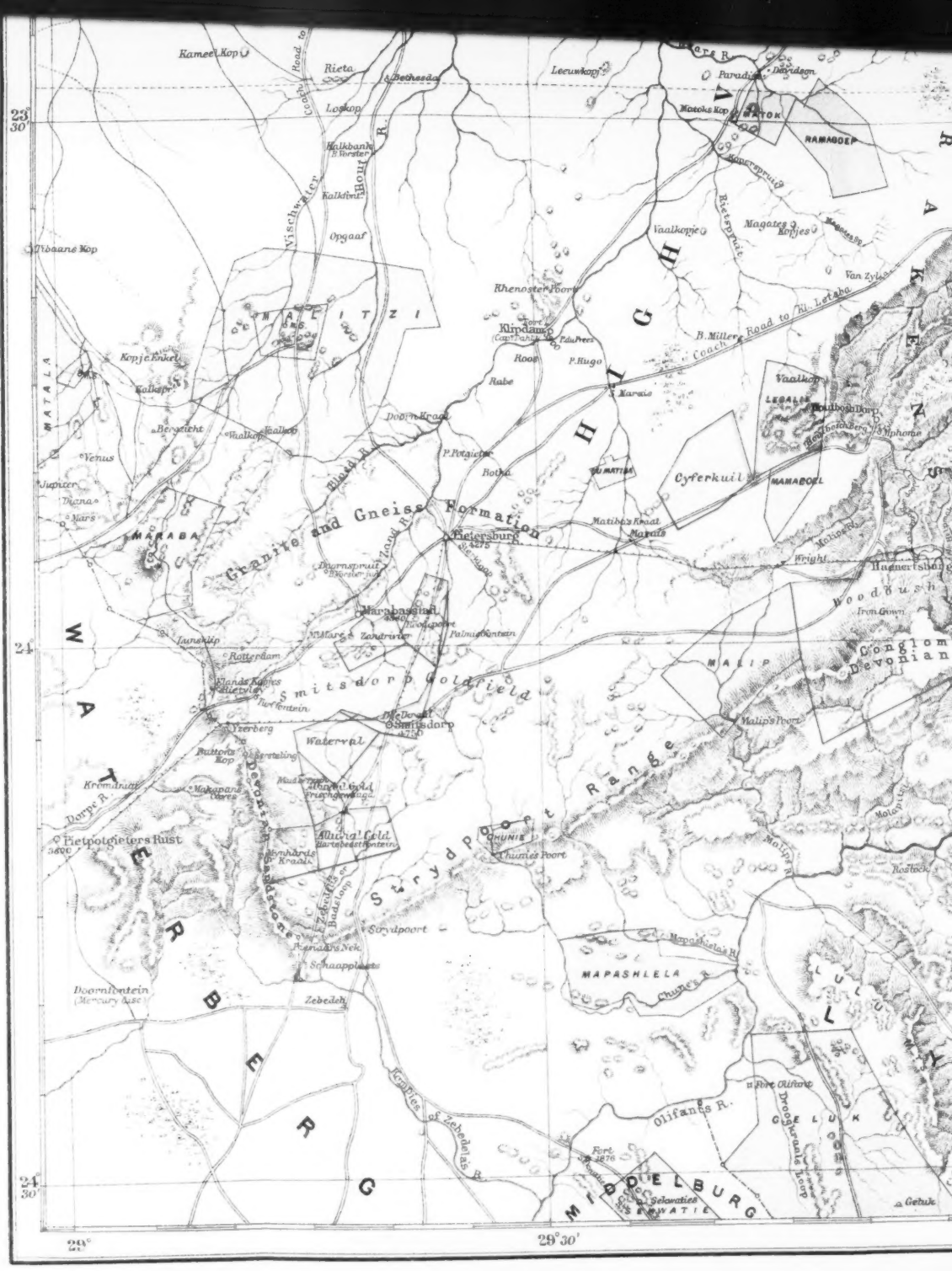
104
106
108
110
22
20
18
16
Man-hao
Kai hoa
An-ping-ting
Fu Thuong-an
Ha Giang
Vinh Dien
Fu Trung-khanh
Kaobang
Tai-ping-chau
Nan-ning
Hsun-chau
Heng-chau
Laokai
Van-ban-chau
Lai-an-chau
Tuyen-kwan
Langson
Yen-bai
Hung-hoa
Viet-tri
Bac-ninh
HANOI
Hai-duong
Haifong
Kebao I.
Wai-chao I.
Lien-chau
Pakhoi
Cho-bo
My-duc
Hua-pan-ha-tang-hok
Nam-dinh
Ninh-binh
Thanh-hoa
Nightingale I.
CHENG KWANG
Futinh Gia
Vinh
Ha-tinh
Dong-hoi
Pu Hak
M. Saniaburi (Saiburi)
M. Lakhon
M. Pa-hin
M. Salom Lakon
Nong-hom
Chieng-sum
M. Pa-chum
M. Borikan
Kam-kheut
Kam-muon
M. Vang
Song Jiang
Tiger I.
Piton
Kua Viet
Kwang-tri
Thuanan
HUE
Cholmai
Turan
Tiger's tooth
Ailao
M. Song-kon
Songkradong
M. Nam-nao
M. Bang-muk-dahan
M. Taratburi
Kalasejm
Kemmarei
Mekong R.
Song-ka
Song-ma
Song-chu
Song-ca
Song-gianh
Song-kien
Song-huong
Song-bo
Song-day
Song-nhue
Song-thai-binh
Song-cau
Song-thuong
Song-luc-nam
Song-thuong
Song-cau
Song-kinh-thay
Song-kinh-mon
Song-bac-giang
Song-thuong
Song-cau

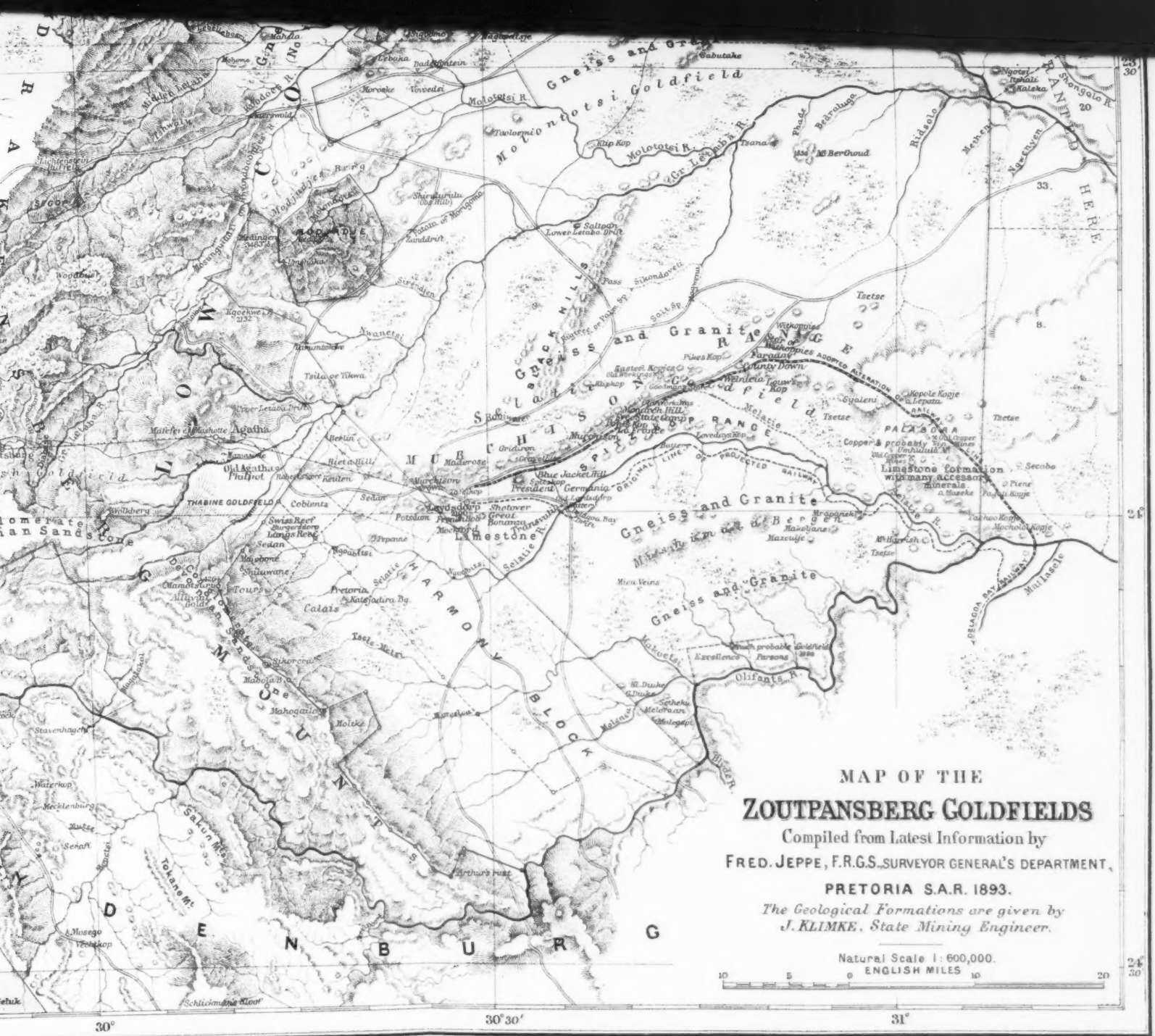
Published by


FRENCH INDO-CHINA
AND SIAM
to illustrate journeys by Hon. G. Curzon, M.P.
Reduced from the Carte de l'Indo-Chine compiled under the authority of the French Minister for Foreign Affairs and the Under Secretary of State for the Colonies by the Members of the Pavie Mission, 1893.
Natural Scale. 1:4,000,000
ENGLISH MILES
50 0 50 100
104
106
108
Kwang-nam
Kwang-ngai
Binh-dinh
Fu-yen
Khanhhoa
Binh-thuan
Bien-hoa
SAIGON
Cholen
Tai-ninh
Thu-dau-mot
Baria
Tan-an
Mitho
Go-long
Vinh-long
Bentre
Tra-vinh
Bac-trang
Ba-dong
Sok-trang
Bak-liu
Rach-gia
Hatien
Kampot
Chaudok
Long-chuyen
Sadeko
PNOMPENH
Udong
Banam
Prey-veng
Kompong-chenang
Pursat
Kompong-tom
Siem-reap
Khong
Stung-treng
Krauchmar
Kratieh
Sambor
M. Attopeu
M. Sapat
M. Saravan
M. Kamtong-Vai
M. Loui-so-tone
M. Lakon-peny
M. Sanassai
M. Sisalatai
M. Ubon
M. Det
BASSAK (CHOMPASAK)
M. Suren
M. Kukan
M. Chonkan
M. Melu-prey
M. Mulapumek
M. Siempang
M. Sek
M. Kao
M. Sukhema
M. Dom
M. Bua
M. Utum
M. Pon-tong
M. Pinnum
M. Kantararom
M. Sanket
Pu-den-muang
Mekong R.
Song-kradong
Kemmaret
Takang
Nam Se
Nam Mun
Se Khong
Se Done
Se Bang Hiang
Pu Luong
Song Ma
Song Chou
Song Ca
Song Bo
Song Thai Binh
Song Lo
Song Chanh
Song Tra Khuc
Song Ba
Song Dinh
Song Cai
Song Dong Nai
Song Vam Co
Song Saigon
Song Vaico
Song Bassac
Song Cho Gao
Song Mytho
Song Co Chien
Song Ham Luong
Song Ba Lai
Song Co Chien
Song Bak An
Song Bassak
Song Kompong Luong
Song Kompong Tralach
Song Kompong Trach
Song Chanh
Song Chiet
Song Sambok
Song Stung
Song Chinit
Song Kompong Thom
Song Kompong Chhnang
Song Pursat
Song Kompong Luong
Song Kompong Tralach
Song Kompong Trach
Song Kompong Chhnang
Song Kompong Thom
Song Kompong Chhnang


29°
29°30'
23
23 30
24
REFERENCES.
Proclaimed Goldfields
Goldbelts, consisting of Archaean Schists with intercalated Quartz Veins
Native Locations
Projected Selati Railway
Alteration of Line proposed by Mr. J. Klimke
Main Roads
Telegraph
Geological Formations surrounding the Goldbelts consist chiefly of Granite and Gneiss as indicated in writing.
Altitudes in English Feet
Gneiss
Granite and Gneiss Formation
Smitsdorp Goldfield
Conglom
Devonian
Woodbush
Iron Crown
Wright
Hammerstsdrift
Pietersburg
Klipdam
Rhenoster Poort
Vaalkop
Cyferkuil
MAMABOEL
RAMAGOEP
MATOK
MARABA
MAKIP
LEGALOE
Boschdorp
Sphome
Zoutpansberg
Waterberg
Drakensberg
Olifants R.
Dorps R.
Klein Letaba R.
Groot Letaba R.
Road to Tuck Camp
Coach Road to Ki. Letaba
Coach Road to Ki. Letaba
Wiklip
Rietz
Lekkop
Kalkbank
Kalkfontein
Opgaat
Kameel Kop
Tooane Kop
Kalkspruit
Kalkspruit
Kalkspruit


30°
30° 30'
31°
23°
23° 30'
24°
ANSBERGEN
Manguete 4473
Road to Fort Salisbury
Road to Chicundo
Lebyubi or Levubo R.
Mahebe
Rebanga or Phukhine
Shingwedzane
PROSPECTING CONCESSIONS GRANTED HERE
Shingwedsi R.
Shivulaan
KNOBNOSES
Ku Molao
TABAAN
Shishimpi
Gneiss and Granite
Madzimbanombi 3600
Letaba Goldfield
Birmingham
Ellerton
Klein Letaba R.
SUTHERLAND
Matungulungu
Rendzimi
Tropic of Capricorn
Gneiss and Granite
Sabutake
Molototsi R.
Molototsi Goldfield
Mosinxi
Partridge
Tsendi R.
Shongolo R.
Ngotsi Itsaits Kaleka
Bráruliga
Rhodes
Mc Bertoud
Tsetse
Shirinzi
Manuwene
Matsena
Gwalale
Mbudzin
Sona
Songotsiwe
Mathote
Dodie
Mashaa
Shitanda
Silarele
Mareeta
Khoetse
Mopethus
Mamahuli
Magor
Sigketsi
Setabi
Mokolotsi
Mathoate
Tsopopi
Mahlo
Lebuka
Dadelfontein
Marooke
Vovedzi
Trawlopmi
Klip Kop
Tsana
Phudé
Ngwenyen
Mechapi
Ridsolo
Lower Letaba Drift
Saltpan
Zandrift
Sikondoreti
Pass
Salt Sp.
Pines Kop
Rasteni Kopjes
Rietpoort
Woodbush
Kaschwe 3232
Tswanetsi
Tsita oe Tikwa
Agatha
Berlin
Old Agatha
Pilgrim's Rest
Rietvallei
Spitzkop
President
Germania
Blue Jacket Hill
Murchison
Matorose
Oridivon
Lovedays Kop
Selatie
Selatie R.
Limestone formation with many accessory minerals
Copper & probably Gold
Copper Mines
Old Copper Mines
Old Workings
Secoho
Piene
Tsetse
Zoutpansberg
Waterpoort
Wyk op Tengruna
Schoemansdal
Pafuri R.
Pafuri Kop 4000
Shetunkolu 1311
Mbassiu Mongalle
Valdezia
Mt Bertoud
Ka Djamela
Shirinzi
Manuwene
Shivulaan
Songotsiwe
Matsena
Shingwedsi R.
Mbudzin
Gwalale
Mosinxi
Partridge
Tsendi R.
Shongolo R.
Ngotsi Itsaits Kaleka
Bráruliga
Rhodes
Mc Bertoud
Ridsolo
Mechapi
Ngwenyen
Tsetse
Tropic of Capricorn
Gneiss and Granite
Molototsi Goldfield
Molototsi R.
Klip Kop
Tsana


Granite and Gneiss Formation
Pietersburg
Smitsdorp Goldfield
Strydpoort Range
MAKABA
MARABA
MAPASHLELA
MIDDELBURG
LEGALIS
MAMABOEL
RAMADOEP
MALIP
Conglom
Devonian
Woodbush
Hagnerstburg
Rietfontein
Smitsdorp
Strydpoort
Pietpotgieters Rust
Olifants R.
Klipplaats
Cyferkuil
Rhenoster Poort
Vischwater
Kameel Kop
Leeuwkop
Paradise
Davidson
Matoks Kop
Vaalkopje
Magatas Kopjes
Van Zyls
Opgaaf
Kalkbank
Kalkbult
Loskop
Rietfontein
Bethesda
Kopje Enkel
Kallaps
Bergzicht
Vaalkop
Venus
Jupiter
Diana
Mars
Doornkraal
Rabe
Roos
P. Hugo
Botha
P. Pietersen
Marais
Matibis Kraal
Wright
Jansklip
Rotterdam
Vlakfontein
Yzerberg
Buttons Kop
Makapans Horts
Kromdraai
Dorps R.
Waterval
Schuddebeurs
Zebedeh
Doornfontein
Schaapplaats
Chunies Poort
Malips Poort
Rostock
Coach Road to Ki Letaka
Eland R.
Olifants R.
Chunies R.
Mapashlela R.
Malips R.
Groot Luk
Klein Luk
Fort Rifford
Fort 1876
Gelukte
Geluk
Kraalties of Zebedeiaas R.
Visschwater Road to
Koperenpruit
Bietespruit
Boschkop
Mphome
Woodbush
Iron Crown
Palmietfontein
Zandrivier
Hartbeestfontein
Schuddebeurs
Bosch Kop
Bosch Berg
Eduard Rees
B. Miller
P. Pietersen
Doornkraal
Palmietfontein
Hartbeestfontein
Schuddebeurs
Zebedeiaas
Mapashlela
Chunies
Malips
Rostock
Olifants
Groot Luk
Klein Luk
Fort Rifford
Fort 1876
Gelukte
Geluk
Coach Road to Ki Letaka
Eland R.
Olifants R.
Chunies R.
Mapashlela R.
Malips R.
Dorps R.
Vischwater
Hout R.
Matala
Waterberge
Strydpoort Range
Smitsdorp Goldfield
Granite and Gneiss Formation
Pietersburg
MAKABA
MARABA
MAPASHLELA
MIDDELBURG
LEGALIS
MAMABOEL
RAMADOEP
MALIP
Conglom
Devonian
Woodbush
Hagnerstburg
Rietfontein
Smitsdorp
Strydpoort
Pietpotgieters Rust
Olifants R.
Klipplaats
Cyferkuil
Rhenoster Poort
Vischwater
Kameel Kop
Leeuwkop
Paradise
Davidson
Matoks Kop
Vaalkopje
Magatas Kopjes
Van Zyls
Opgaaf
Kalkbank
Kalkbult
Loskop
Rietfontein
Bethesda
Kopje Enkel
Kallaps
Bergzicht
Vaalkop
Venus
Jupiter
Diana
Mars
Doornkraal
Rabe
Roos
P. Hugo
Botha
P. Pietersen
Marais
Matibis Kraal
Wright
Jansklip
Rotterdam
Vlakfontein
Yzerberg
Buttons Kop
Makapans Horts
Kromdraai
Dorps R.
Waterval
Schuddebeurs
Zebedeh
Doornfontein
Schaapplaats
Chunies Poort
Malips Poort
Rostock


MAP OF THE
ZOUTPANSBERG GOLDFIELDS
Compiled from Latest Information by
FRED. JEPPE, F.R.G.S., SURVEYOR GENERAL'S DEPARTMENT,
PRETORIA S.A.R. 1893.
The Geological Formations are given by
J. KLIMKE, State Mining Engineer.
Natural Scale 1 : 600,000.
ENGLISH MILES
10 5 0 10 20
30°
30°30'
31°
23° 30'
24°
Gneiss and Granite
Limestone
Pretoria Series
Waterberg Series
Molopotsi Goldfield
Spelonken Goldfield
Pilgrim's Rest Goldfield
Thabine Goldfield
Harmony Block
Zoutpansberg
Lowveld
Drakensberg
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